FOOD MANUFACTURE

Incorporating Food Industries Weekly

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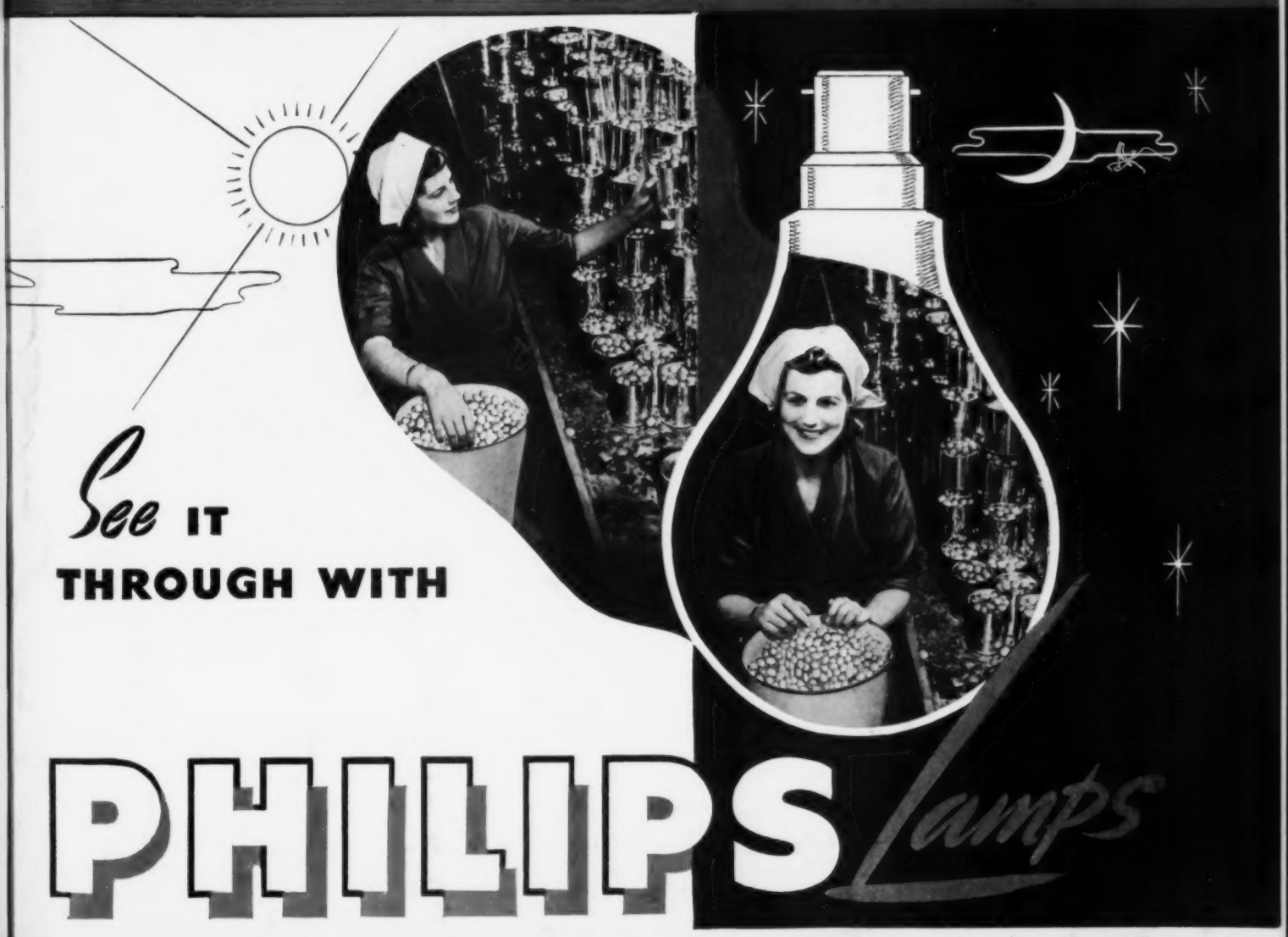

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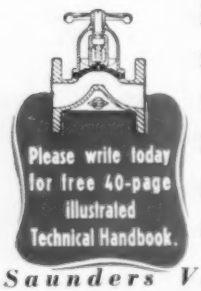

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FOOD MANUFACTURE

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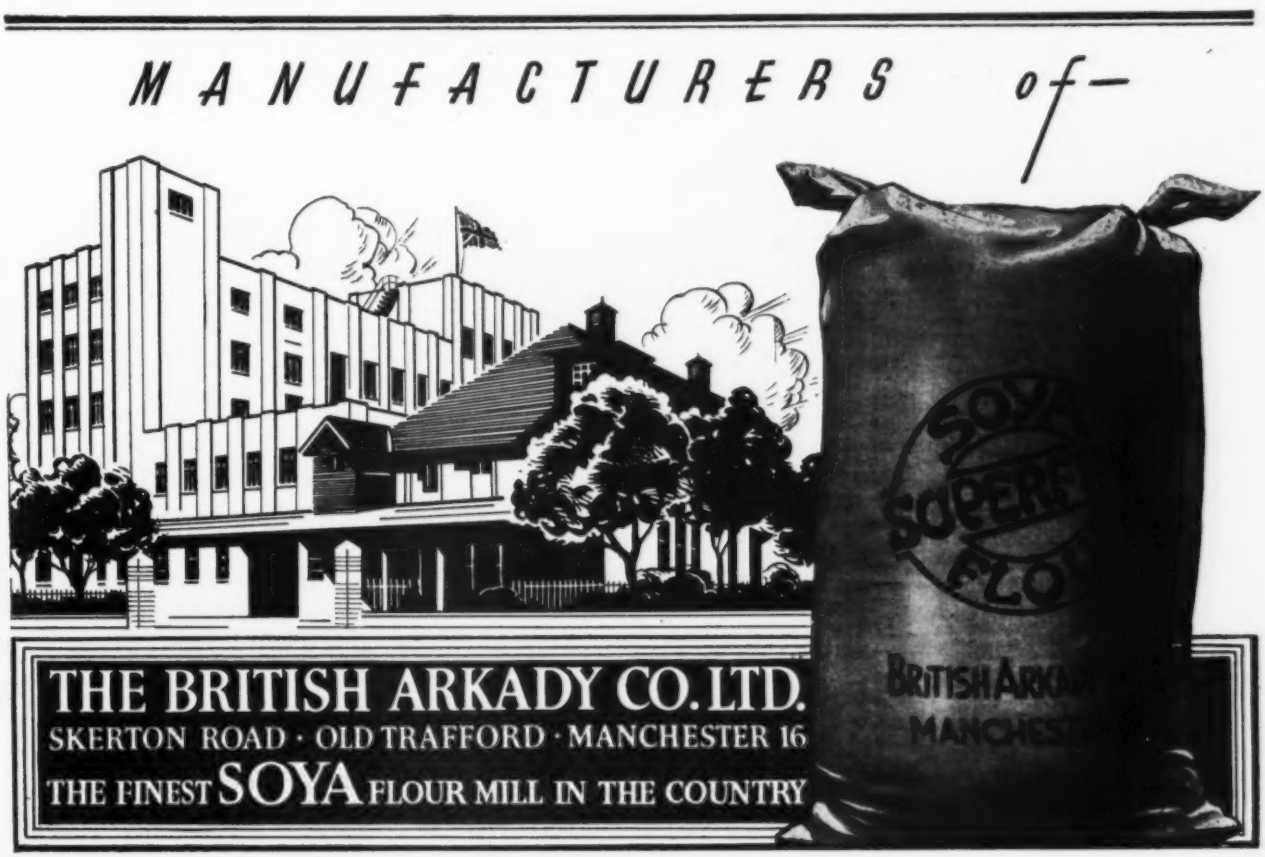
The Editor will be glad to consider contributions from those engaged in the Food Industry. Articles intended for publication should be of a practical nature and accompanied by photographs or drawings when possible.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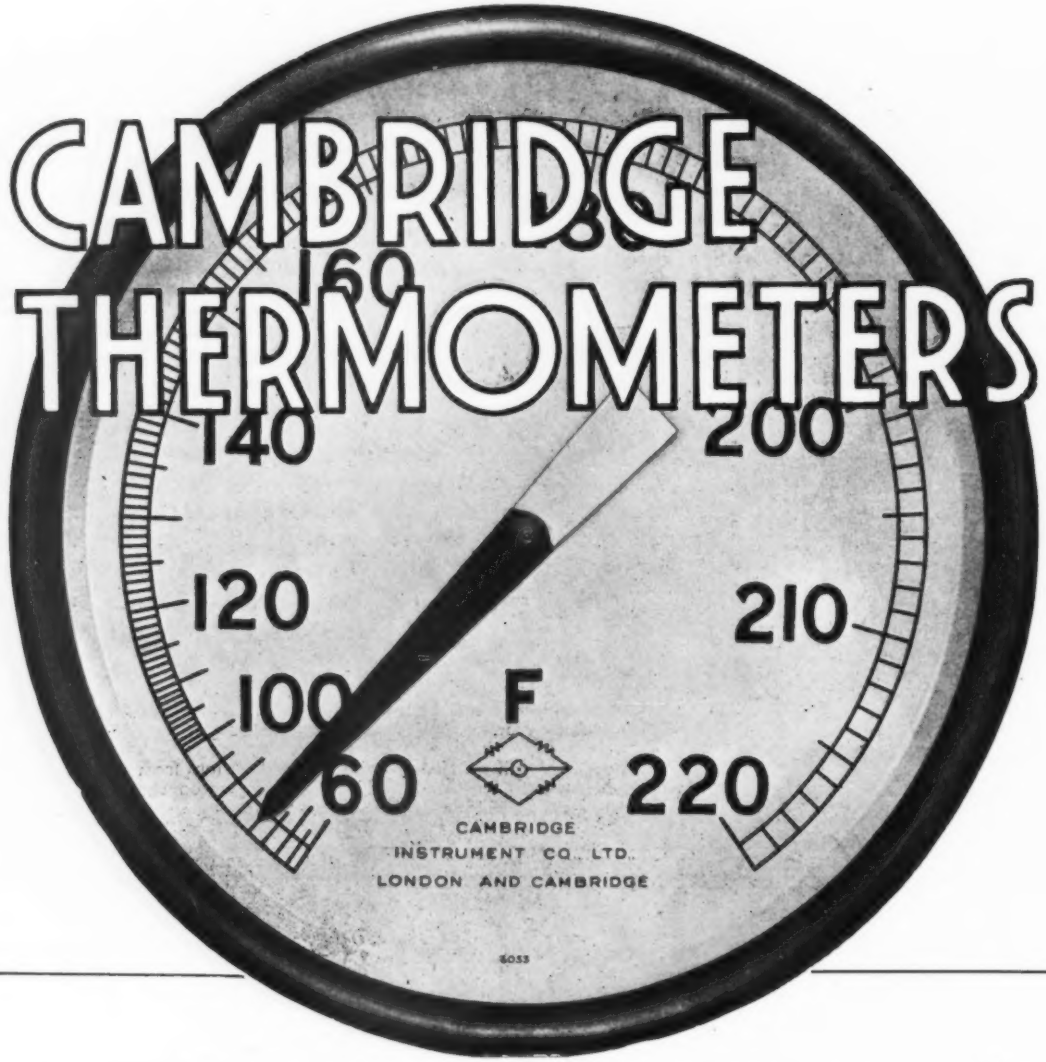

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FOOD MANUFACTURE

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Vitamin B_1 and Contentment

THAT THE much-announced tool for success—Hitler's secret weapon—may be the deprivation of conquered people of vitamin B_1 is the view of Dr. Russell M. Wilder (of the Mayo Clinic), according to *Science News Letter*. German use of the fullest knowledge about nutrition is not confined to seeing that their workers and armed forces are properly fed; it appears to be used also negatively, so to speak by applying thiamin starvation to bring, and keep, the populations of occupied countries to a condition of depressed mentality which will make them acquiescent, uncritical and submissive towards the occupying forces. It will also have the effect of rendering the subjugated populations unwilling to co-operate among themselves.

One of the signs of thiamin deficiency is a minor irritability coupled with suspiciousness and distrust of others, making the sufferers lack the desire to co-operate. Dr. Wilder thinks that there is a relationship between deficiency of vitamin B_1 and industrial troubles in normal times. Workers become thiamin-starved because of poor food, and this leads them to make unreasonable demands. The employers, however, are in no better case. Middle-aged industrialists, having become paunchy, try to reduce their weight, and unconsciously restrict their diet in such a way that their intake of vitamin B_1 becomes insufficient; as a result they become testy and irritable. So two kinds of people, both of them in abnormal mental states, try to negotiate under the worst possible conditions.

The ascription of such subtlety to the people concerned may savour of fantasy, but Dr. Wilder's suggestion is worthy of note. There are, however, other food elements, the deprivation of which may well produce the symptoms mentioned, and the lack of vitamin B_1 may be incidental. Looking on the other side of the picture, we have the example of what improved dietaries can do in the case of African workers, whose contentment was reflected in considerably increased production.

"Self-Sanitising" Cement for Floors

The Annual Report of the Researches of Mellon Institute, 1940-1941, has something of interest for those in charge of food factories. J. H. Young has carried out further work on "Hubbellite", which is a cement of the magnesium oxychloride type containing copper. This cement is "non-sparking" and therefore of direct interest in mills and factories (such as dextrin-making factories) where the striking of sparks from the floor may constitute an industrial hazard. It is already being used in the flooring of certain U.S.A. explosives factories. The interest of this type of cement to the food chemist is its so-called "self-sanitising" properties. When in contact with water, as is the case when the floors are swilled, a minute amount of copper is liberated in an active bactericidal and fungicidal form. Because of the oligodynamic action of the copper in this cement, moulds cannot survive on its surface. The amount of copper liberated is only an infinitesimal amount of the total present in the cement, and the bactericidal and fungicidal effect appears to be permanent. The importance of this in food plants, where disinfectants have to be used with caution because of the risk of development of odours in the products, is obvious. While the floor is not an electrical conductor, it allows static charges on machinery to leak away, and this prevents the building up of the static to sparking potentials.

Saccharin Ramp

That the vendors of saccharin preparations have been making hay while the sun shines is evidenced by some recent prosecutions. Under the Food and Drugs Act saccharin occupies a somewhat anomalous position, as is pointed out by Mr. J. E. Woodhead in a recent issue of the *Pharmaceutical Journal*. The prosecutions were taken under Section 6 of the Food and Drugs Act, which states that a vendor who issues a label which falsely describes an article or is otherwise calculated to mislead is guilty of an offence. However, what constitutes a "misleading" label is capable of wide interpretation, and judging from the results of recent prosecutions, it must be admitted that a purchaser who feels himself aggrieved has no remedy under the Food and Drugs Act.

One prosecution concerned a sample of tablets submitted by a ratepayer with the complaint that they did not sweeten. They were 1 grain tablets containing 0·04 grain of saccharin. The label stated that, dissolved in a little water, they made a sweetening syrup, and he was advised that he had no remedy under the Food and Drugs Act. With two exceptions, all the tablets examined were made up to the conventional weight of 1 grain. Saccharin solutions, some of which appear to command a large sale, are described variously as sweetening agents or sugar substitutes, and their sales depend on the claims printed on the labels. One of these, supplied in bottles containing 2 fluid ounces, claimed to have the sweetening power of about 2 lbs. of sugar. Analysis revealed it to contain 0·37 per cent. of saccharin in a very dilute sugar solution; the sweetening power, therefore, was equivalent to about 4 ozs. of sugar. Convictions were obtained against the makers by two London Borough Councils under the Food and Drugs Act, and as a result the wording has been changed.

As a war measure, it is suggested by Mr. Woodhead that saccharin tablets should be required to have the amount of saccharin per tablet printed on the label; that all preparations containing saccharin should disclose the presence and amount of saccharin on the label; and, if offered as a substitute for sugar, should state the equivalent of sugar which the article purports to replace.

Manx Kippers

A member of the Isle of Man Fisheries Board recently said to the *Evening Standard* reporter: "We don't care what the practice is in England; we have decided that kippers made in the Isle of Man shall not be dyed." It will be remembered that the matter of the dyeing of kippers was discussed in the House of Commons two or three years ago.

Some of the Manx kipper curers are protesting against the order prohibiting the use of dye, but, as recorded, the authorities are adamant. There is an enormous demand for Manx kippers at the present time, and £9,000 worth are being sent over to the mainland.

The use of harmless colours in foods is by no means to be deprecated—they probably brighten the table and the idea underlying their use is psychologically sound and physiologically admissible—but we vote every time for the smoke-cured kipper in general and for the Manx smoke-cured kipper in particular. We've tasted them in their home place.

"Synthetic" Milk

In a letter to *The Times* a correspondent suggests that in view of the possible milk shortage, synthetic (*sic*) milk should be supplied.

He points out that "dried milk can be imported more economically than condensed milk and that the other constituents are either butter or other fat and water. Any vitamins could be incorporated at the stage of emulsification. Such synthetic milk cannot be distinguished by the ordinary cigarette-smoking adult from fresh milk after pasteurisation".

This process is (or used to be) carried out in liners—the result was rather feeble in some bases, but that was probably due to faults in technique.

To produce "reconstituted" (we prefer the word to "synthetic") milk on a large scale would involve much handling and would certainly increase the price of the product to a very large extent. We do not know whether the correspondent refers to dried full milk or dried skim milk (his mention of the addition of butter seems to indicate the latter), but surely it would save infinite trouble and expense for the dried full milk to be delivered direct to the consumer, who would simply dissolve it in water without the aid of a machine. And what if it did taste a little different from pasteurised liquid milk even to the cigarette smoker? Many things taste different these days, but we survive.

Aniline Food Colours and their Detection

A useful review of the technical and chemical names of many of the artificial dyestuffs that have been used for colouring food products has been given by Z. Sándor in *Mezögazdasági Kutatások*, Vol. 13, pp. 245-266. An outline of the chemistry of many such materials is also included, so that the article forms a work of reference of which the utility is diminished only by the fact that the paper is written in Hungarian, with a short German summary.

The author tabulates the behaviour of aniline food colours during electrophoresis and describes suitable apparatus for observation of cataphoresis of dyestuff solutions in water or in gelatine. He points out the interesting fact that the majority of the dyestuffs of which the use in foodstuffs is prohibited in Hungary wander during electrophoresis to the negative electrode, while the majority of permitted dyes seek the positive electrode. Amongst the prohibited dyes are Auramine G, Thioflavin T, Aurantia, Martius yellow, Flavazin, Phosphine, and Metanil yellow—all of these except the last being attracted to the negative electrode. Among the permitted dyes are Auramine O, Tartrazine O, Tropæolin OOO, Phloxine O, Amaranth O, Ponceau R, Bordeaux B, roccellin, indigo-carmine, alizarine blue, and methylene blue—all attracted to the positive electrode; while among the permitted dyes that are attracted to the negative electrode there are few besides malachite green and Wesserblau B.

It is worth noting that the fat-soluble and spirit-soluble dyes have little tendency to seek either electrode; thus, aniline blue (spirit-soluble) wanders only slowly to the negative electrode, as also does Eosin S, but only in gelatine; while Sudan G is not attracted by either electrode.

Although the lists of permitted dyes in Hungary and in other countries are not identical, it looks as if the property of wandering to the positive electrode during electrophoresis offers a presumptive test of harmlessness. It will be interesting to see whether this suggestion is borne out by the further work on dyestuffs of vegetable origin which is promised.

The method of electrophoresis also offers an opportunity for separating two components of a mixture, provided, of course, that the constituents are attracted to different poles. For applying the method to foodstuffs it is suggested that it is sufficient to make an extract of the food which it is desired to examine; no details of any clarification technique are given.

Carotene Analysis of Vegetables

Certain observations bearing on the reliability of carotene analysis as a means of predicting the vitamin A value of plant foods have been made by M. Cammack Smith and L. Otis, Department of Nutrition, University of Arizona, Tucson, Arizona (*Food Research*, **6**, 2, 143).

Using the Sherman bio-assay technique, deeply pigmented carrots containing 140 micrograms per gram were found to have little more than twice the vitamin A value of pale orange carrots, which contained less than one-tenth as much carotene by analysis.

The carotene content of carrots as measured by the Peterson-Hughes modification of the Guilbert method was found to vary with such factors as colour, length, age, portion of the root sampled, and time of storage, in the range of 7 to 170 micrograms per gram.

The observed discrepancy between the vitamin A value of carrots, as predicted from carotene analysis and as determined by bio-assay, may perhaps be partially explained by variations and errors in sampling which are difficult to avoid in the eight-week test period employed in the bio-assay.

It is quite evident, observe the authors, that there are several factors which need to be considered further, and that analyses of plant foods for their carotene content as made by the accepted procedures in use at this time cannot be considered a reliable procedure for an accurate picture of their physiological value as a source of vitamin A.

Beef Colour Study

Some interesting tentative conclusions have emerged from the study of factors influencing beef colour. Dark-cutting beef is characterised by a low reducing sugar content, a high *p*H and low phosphorus, among other factors. These factors influence the oxygenation cycle of hæmoglobin, which in turn is reflected in the visible colour.

The reduction of the sugar content of muscle by withholding feed from the animals in cold weather, or experimentally by the administration of insulin, produces dark-cutting beef.

Lack of balance in the diet tends to produce a less desirable carcase from the standpoint of the colour of the meat as well as other carcase characteristics. It was found that cattle fed on a greater than normal amount of fat had hæmorrhagic livers. Abnormal feeding, exposure and improper handling were considered to be some of the factors involved in producing dark-cutting beef.

If the animal is thoroughly chilled just prior to slaughter, as may occur in transit to market, the colour of the beef may be adversely affected.

This problem was studied by a technical committee specially appointed, and composed of members of the National Live Stock and Meat Board (U.S.A.), the American Meat Institute, Armour and Co., Swift and Co., and Wilson and Co.

A Dream-World Town

"A friend of mine spent some days last week in one of those fantastic dream-world towns, so oddly out of tune with the times, where the war is not allowed to intrude."

So writes a correspondent in the *Sunday Sun*.

The friend found the food supply better and cheaper than the North's. There was no noticeable lack of goods and there was an imposing array of tinned foods of well-known brands—and he didn't mean chopped carrots—that so seldom find their way to shop shelves in this part of the world.

Cigarettes were in moderately good supply though customers had to queue up for them. Every garage had petrol, but there was the inevitable fly in the ointment—a shortage of beer.

The writer comes to the brainy conclusion that there must be something wrong with distribution!

Vitamin Contents of Dried Mushrooms

K. Kawakami and H. Miyayoshi have examined some common Oriental mushrooms in dried form for their vitamin and ergosterol content (*Report of the Institute of Scientific Research, Manchukuo*, Vol. 4, 1940, pp. 399-403), and have shown that two of the most esteemed are rich in vitamin B_2. The species examined were *Pleurotus serotinus* Schrad, *Armillaria mellea*, and *Cortinellus shiitake*. All these grow on wood, and would consequently be regarded as suspicious by most Westerners. The first named is sometimes called the Olive Pleurotus; it is one of the white-spored gill agarics, and not all Occidental authorities recognise it as edible. *Armillaria mellea* is the honey fungus; like the Pleurotus, it has a wide distribution. The third species seems to be chiefly Oriental, and under the name of shiitake is a favourite food of Japanese. It is largely imported from China, where it is cultivated on logs. All species were poor in vitamins B_1 and C, and had about 0·30 gm. of ergosterol per 100 gm.; but while the honey fungus had only 52 γ of vitamin B_2 per 100 gm., shiitake had over 500 γ, and the Pleurotus nearly 1,300 γ, per 100 gm.

Glycerine in Ice Cream

Among ice cream technical men there is increasing recognition of the advantages of glycerine from the standpoints of efficiency of production and quality of the finished product, stated G. Leffingwell and M. A. Lesser in a recent contribution to the *Ice Cream Review* (U.S.A.).

Glycerine has a combination of several properties. It is a solvent for materials used in ice cream, and is an effective suspending medium for others. In addition to these it possesses preservative properties and in small quantities imparts smoothness and retards graining and coarseness. It also rates high as a sweetening agent.

With regard to the legality of its use the Food and Drug Administration has ruled that " there is no objection to the use of small quantities of glycerine in food products provided it is of a purity suitable for food use and provided its presence is plainly declared on the labelling when it is not a normal ingredient of the article ".

During recent years, glycerinated eggs—particularly yolks—have been increasingly used in ice cream manufacture. Martin and Caulfield reported that egg yolks for ice cream may be suitably preserved and stabilised by the addition of 5 per cent. corn sugar, 1 per cent. glycerine, and 0·5 per cent. gelatine stored at 0° to 10° F. They also report that ice cream made from the stabilised frozen yolks whipped approximately two minutes faster than that made from a check mix containing unstabilised yolks.

Propionic Acid and Mould Growth

The use of salts of propionic acid to prevent mould growth and in the baking industry has been covered by patent, and independent evidence as to the efficiency of these products now comes from Australia. According to *The Australian Baker* (1940, xliv, 11), experiments have been carried out in Sydney on the control of bread moulds, using sodium propionate, which was added to the dough. Certain complications in the normal manufacturing process were introduced, but could be overcome, and the method gave very promising results in the elimination of these moulds.

The addition of 5 per cent. of white distilled malt vinegar was also found to give good inhibition of mould growth.

F. W. Miller (abs. in *Nat. Butt. J.*, 1940, **31**, 12 and 38), at E. I. du Pont de Nemours Company, has examined the effect of sodium and calcium propionates and propionic acid on the development of air-borne moulds on cheese. The cheese cuts were first exposed to contaminate them with the various air-borne organisms, then dipped into the solution, drained and stored in cellophane bags at 58° to 60° F. at 90 per cent. relative humidity.

The free acid was found to be twice as effective as the salts in its inhibiting action on mould growth, and a 15-second treatment with an 8 per cent. solution of the acid, followed by draining for 4 minutes, delayed the onset of mould growth by 18 to 21 days. The application of these substances to other suitable foodstuffs for the inhibition of mould growth should prove interesting.

Prevention of Mould Growth by Physical Means

In America much work has been done on the use of physical means for the prevention of mould growth. One enterprising firm, selling bottles to the pharmaceutical profession, have instituted a merchandising plan to enable pharmacists to procure a bactericidal ultra-violet lamp for fitting above the prescription tables, the idea being that the area in which the prescription is made up is irradiated with ultra-violet light, which will kill many of the air-borne organisms.

According to C. Rentschler (*Ind. Eng. Chem. News Ed.*, 1941, 289), many of the air-borne bacteria can withstand temperatures of 180° C. without destruction, but are killed by ultra-violet light.

This type of work is being widely followed up in the States, and B. H. Gilmore (*ibid.*, 1941, 396) has investigated the action of ultra-violet light of wave-length 2537 A. in sterilising and tendering beef during its storage prior to sale. The method is also of value in the baking industry. When freshly produced foods are submitted to both the direct and indirect effects of irradiation, a marked reduction in the initial surface contamination occurs and the storage life of the product is considerably prolonged.

Even if proper care is taken in handling the goods and the air in the storage chamber is filtered and water-washed, contamination by persons or air entering the chamber when it is opened cannot be entirely suppressed and re-infection of the surface may take place. By installing ultra-violet lamps in the storage chamber the air is kept sterile, and even where the products lie in the shadows, and are thus not irradiated, considerable beneficial effect is obtained owing to the presence of ozone, which the rays from the lamp produce by their action on the oxygen of the air. Thus an essentially sterile atmosphere is obtained in which the goods may be stored or further processed, as in cooling, slicing and wrapping bread and other baked goods. In some American plants, which have air washers and air filters installed, the air is further treated, after passing through the cleaning plant, by a battery of as many as twenty ultra-violet lamps, which deal effectively with any air-borne infection.

White v. *Brown Bread*

Much has been written about the British people's taste for white bread, but we do not remember ever having read any attempt to explain *why* the preference is so definite. We wonder what the food psychologist (if such a person exists) would have to say about it. Is it the colour of brown bread that offends? This is hardly likely, as there are quite a number of brown foods, and " browning " to colour others is quite a popular article. Is it the taste? It may possibly be that when brown bread is eaten with other articles of diet the two tastes are incompatible, and that the more neutral taste of white bread gives fuller value to that of other foods.

Unfortunately in such an analysis, bread, whether white or brown, must be subdivided under various headings such as new and stale, not to speak of the widely varying products of different bakers. Home-made white bread made with buttermilk in the Irish mountains (we remember) spoilt our taste for commercial white bread for many a long day.

But surely there is some reason (apart from habit) for the overwhelming trend towards the white loaf, whether it be taste, smell, colour or texture, or is it that the brown loaf is in the position of the unpopular doctor:

I do not love thee, Doctor Fell,
The reason why I cannot tell. . . .

LUBRICATION MAINTENANCE

Maintenance work in a factory lubrication department should aim at oil economies by keeping lubricating devices in satisfactory working order, by adopting processes for the recovery of usable lubricant from old oil supplies, as well as operation practices intended to reduce the deterioration of oils during service, and, in some instances, to reduce the consumption of lubricating oil.

F. J. MATTHEWS, B.Sc.

EFFICIENT lubrication of machinery is a national asset at the present time, in various respects; wasteful consumption of oil is prevented, and at the same time machinery is kept operating with the minimum of wear and breakdowns which would entail undesirable loss of output. Breakdowns may also involve repairs or replacements which, apart from increased expense under prevailing conditions, will take skilled personnel in the engineering industry from more vital war work. High oil consumption may be due to excessive oil feeds to bearings and the like, or to unduly rapid deterioration of the lubricant in service. Ordinary maintenance work in a factory lubrication department should aim at oil economies by keeping lubricating devices in satisfactory working order, by adopting processes for the recovery of usable lubricant from old oil supplies contaminated with impurities after a period of service, as well as operation practices intended to reduce the deterioration of oils during service, and in some instances to reduce the consumption of lubricating oil.

The Choice of Oil

The choice of the oil in the first place has an important influence on its deterioration during use. It is known that straight mineral oils do not oxidise as readily as compounded oils containing small percentages of animal or vegetable oils such as rape, cottonseed, olive, lard, tallow, and castor oils. The latter are used to give the lubricant greater spreading powers, a very necessary feature under some operating conditions such as where moisture is present. There is an alternative to the use of such ingredients, however, in the use of colloidal graphite added to the oil. This material has been shown by various authorities to form a graphoid film on metallic surfaces, this film aiding oil-spread due to its great "wettability". The most recent research, too, on the well-known "dag" brand of colloidal graphite has indicated another valuable characteristic. Tests have shown that the presence of this material reduces oxidation of an oil, and the material also lessens formation of asphaltic materials. The importance of the former point—its action as an anti-oxidant—is evident. In connection with the latter point, we may note that asphaltic materials tend to gum up an oil and the thickening action will vitiate lubrication by tending to choke oilways, form hard deposits, etc. Reduced deterioration in service is therefore obtained, which is a big aid to economy.

Oil Feeds

Actual economies by way of reduced oil feeds are also possible. It has been shown by various authorities that owing to improved oil-spread over working parts, a reduced feed of oil gives satisfactory lubrication. Tests conducted on the "dag" brand by the National Physical Laboratory showed the minimum permissible oil feed to be 40 per cent. lower than with a non-graphited oil; in other cases a reduction to almost one-third of the former oil consumption has been effected. It is well known nowadays that the graphite also protects bearings against seizure should there be an accidental failure of lubricant. The use of oil has been avoided almost completely in some cases. Where engines operate on saturated steam, an emulsion of colloidal graphite in water has been found satisfactory for cylinder lubrication and a large number of engines operate under such conditions at present. This has the added advantage that there is no oil contamination of condensate, which accordingly may be safely returned to the boilers, with attendant fuel economies and conservation of the national fuel resources and man-power.

Recovery of Used Lubricants

A good oil does not wear out: its deterioration is very largely due to accumulation of impurities such as sludge, acids, metallic particles, dirt, etc., and removal of such contamination leaves the oil practically as good as it ever was in respect of lubricating powers. Recovery of used lubricants is therefore very good practice.

It is essential, however, that removal of the impurities shall be thoroughly effected. There are nowadays special designs of filter, as well as centrifuges, for removal of the impurities, and the use of some such equipment is well worth while where possible. There are various reasons for this.

When a used oil is filtered (one should really say "strained") through a coarse filter cloth, it is said that the process will remove the largest particles which do the most damage. It is overlooked that the very small particles can get into bearing clearances more easily than large particles, and that there are very many more small and minute particles than there are large particles. More metallic wear may therefore be attributable to the small particles not removed in such a recovery process. The unsatisfactory results often obtained after such poor treatment are probably due to this factor.

Types of Filtering Material

The trouble about using a good fine cloth is that the cloth soon chokes up and filtration is so slow that attempts are made to speed things up by selecting a more coarse filter cloth. The result is quicker filtration but poorer separation and, consequently, a less satisfactory recovered lubricant. The ordinary methods of filtration are bound to fail, for this reason: the finer the filter cloth, the more easily are the passages choked with oil sediment; a coarse filter will operate longer, but will separate less impurities. Compare this situation with that obtained when a specially-designed filter is used. These types of filter operate on something like the "edge" principle—that is, a number of sheets of paper, metal, or something similar, are tightly pressed together and their combined edges are used as the filtering medium. They will retain the finest particles in the normal lubricating oil. One form of such a filter consists of a large number of rings clamped together to form a hollow cylinder. Filtration is effected by causing the oil to pass (under pressure or drawn by vacuum) from outside the rings through the edges into the central bore of the cylinder, whence the clean oil is drawn off. The ease of cleaning such a filter may be emphasised. All one has to do is to apply air-pressure to the central bore of the cylinder, thus blowing off the accumulated sediment and leaving the filter clean for fresh filtration. Whenever the rate of filtration falls off, the filter can be easily cleaned and the output speeded up again. It is not possible to do this with an ordinary cloth filter; in fact, it is frequently necessary to destroy the dirty filter medium and fit a new cloth or paper. Such a special type of filter is therefore well worth consideration, especially since it may be used for many years to effect substantial economies in lubrication costs.

Absorbent Materials for Clarification

Where some form of "edge" filter is not available, and it is desired to do what is possible at a minimum expense, filtration can be improved by the use of some absorbent such as fuller's earth. The principle of this operation is that certain natural earths have the property of attracting particles from liquids; the particles are held attached to the earth, and thus filtration is assisted. A preliminary sedimentation of oil is also useful; if the used oil is allowed to stand for a few weeks, the larger particles will settle out and so lessen the amount of filtration required. Heating the oil will also speed up the rate of filtration, due to the greater fluidity of the lubricant. If heating, however, is practised, care should be taken not to heat the oil over about 150° Fahr., since higher temperatures will tend to decompose certain constituents, lessen the lubricating powers, increase carbon deposits, etc. Slight acidity in used oils may be counteracted by washing with a dilute alkali solution and finally wash-

ing free from alkali. Strong alkali such as caustic soda should not be used, since this may attack the oil compounds and cause trouble; washing soda in dilute solution should be used—not more than 2 to 5 per cent.

Maintenance of Lubricating Systems

Regular attention should be given to lubricating devices, to make sure they are operating satisfactorily. Temporary failures of lubricant, or even reduced supplies of oil, will mean overheating of bearings and, apart from possible mechanical wear, the oil deterioration will be increased by the increased temperatures to which the lubricant is thus exposed. Undue moisture admitted to a lubrication system may also mean trouble, since emulsion may be formed between oil and water; such emulsions are often very poor lubricants and tend to increase the wear of oils due to increased oxidation, sludging, etc.

Stock barrels of oil should not be left without bungs, since moisture may enter by condensation from the atmosphere. Where a lubricating oil is circulated on a machine, and the circuit includes an oil cooler, arrangements should be made for the water pressure on the cooler to be lower than the oil pressure; this will ensure that if a leak develops at the cooler, as it is almost certain to do to some extent, oil will pass out into the water rather than water leak into the oil. Oil in water is easily detected, but water getting into the oil system will cause a deal of trouble before it is spotted. Incidentally, where a used oil is contaminated with an emulsion, it may be difficult to filter; it is a good plan to treat the oil in such cases with a warm, weak alkali solution before trying to filter.

Methods of Applying Lubricant

The application of the lubricant is quite as important as choosing a good oil. Faulty application of the best oil may give results quite as unsatisfactory as if a cheap, low-grade lubricant were used and efficiently delivered to the machine parts. Maintenance work should not overlook lubricating mechanisms however "automatic," since lack of attention has often caused irregularity of oil feed or even complete stoppage of supplies. The result is overheating, and the increased temperature of bearings, etc., to which the oil is exposed, means increased deterioration. The feeding of extra supplies to overcome a lapse in lubrication is rarely effective; more usually the surplus oil causes added trouble by charring or assisting formation of deposits which interfere with valve operation (as in compressors) or cause piston rings to stick. In addition, there is a waste of oil.

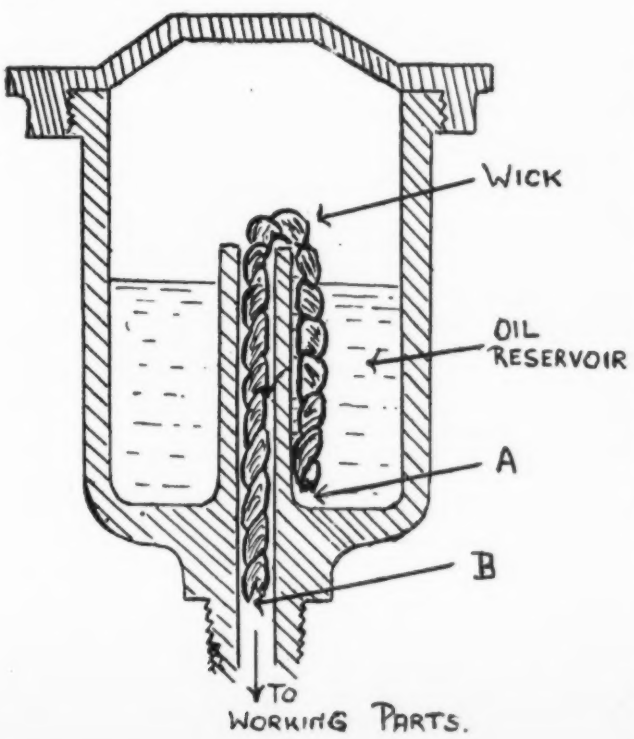


Fig. 1.

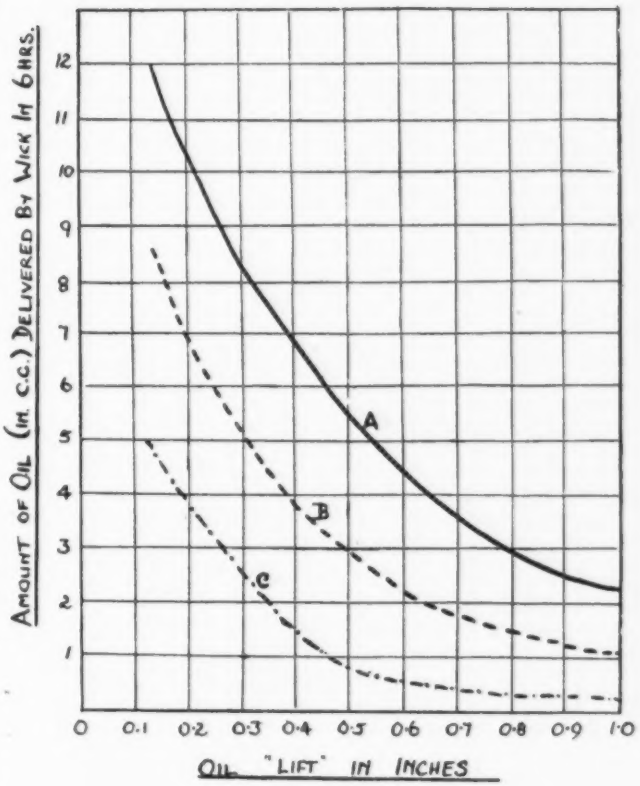


Fig. 2.

In the development of methods of applying lubricants, open oil holes fed from squirt-cans and hand-operated lubricators were followed by semi-automatic lubricators which really depend upon the human operator for regular attention. Pressure lubricating systems and mechanical lubricators are preferred to-day as being dependable for maintaining lubrication continuously and positively, irrespective of human failure, with consequent extension of the life of the machinery. It is not possible within the compass of a brief article to discuss all such methods and mechanisms; it is proposed instead to refer to the maintenance of a few devices in common use.

The Sight-Feed Oil Cup

A well-known mechanism is the sight-feed oil cup, which feeds oil in drops more or less automatically, but requires occasional human adjustment. This device usually consists of a glass cup or oil container, the bottom outlet of which is fitted with an adjustable needle valve. Therefore the feed can be set at any desired rate, but it must not be overlooked that once the valve has been set the rate at which the oil passes out will depend upon the head of oil, which diminishes as the oil is used up. Owing to the influence of temperature upon the viscosity of lubricating oil, the head will also vary according to the temperature of the engine-room or other surroundings. Regular attention for continual adjustment of the needle valve is therefore required. Another point is that if the needle valve becomes clogged or partially clogged by a little dirt from poorly filtered oil, then the oil feed may be seriously diminished or even stop altogether. It is advisable, therefore, to use a good oil very free from grit and, at the same time, watch for any tendency to clog the valve. This method is fairly satisfactory for oiling bearings, as long as its limitations are not forgotten. Nevertheless, the device is largely dependent upon attention from the attendant, and is therefore liable to be overlooked, particularly when it is in inaccessible places.

The Bottle Oiler

A device of a similar nature is the bottle oiler, which consists of an inverted bottle fitted with a cap carrying a metal rod, this fitting sufficiently freely to allow the escape of oil from the bottle. The principle of the method is that the rod rests on the journal, with the result that as soon as motion starts the vibration imparted to the rod results in oil flowing down to the bearing. Whenever the machine is shut down and the bearing stops

turning the oil no longer flows down the rod. This method, therefore, helps in the economical use of lubricant. A similar expedient is the oscillation lubricator, where vibration throws valves off their seats and oil is then delivered. It has been used quite successfully on horizontal bearings, more particularly whose speed and size are moderate. Crank-shaft bearings of horizontal piston-type pumps have been satisfactorily lubricated in this way.

The Wick-Feed System

A development of the bottle oiler is the wick-feed system of lubrication which utilises the capillary action of a wick or strands of yarn to syphon oil from a reservoir into a pipe which leads the oil to the part to be lubricated. With this type of lubricator it is essential to keep the end of the wick below the oil level (as at A in Fig. 1.), otherwise the oil will not be delivered; syphon action will also be prevented if the delivery end B of the wick is not at a lower level than the end A which is in the reservoir. These may seem elementary points, but they are sometimes not appreciated. The reservoir should be replenished regularly, and to ensure the wick end remaining under the oil it may be stiffened by wrapping it around a stiff wire. The amount of oil which can be fed in this way depends upon both the viscosity of the oil and also upon the composition of the wick. If the oil is too thick, the feed will be slow, and if the yarn or wick has too many strands in it the oil will flow too rapidly. By adjustment of both these variables, therefore, a fair variation in the rate of oil feed is possible. The effect of quality of yarn is shown by Fig. 2, which graphs data for the rate of oil delivery obtained on the same oil and at the same temperature with three different qualities of wick. Note the variation in delivery, both in respect of quantity and the amount of " lift " possible with a given yarn. It is seen that the delivery falls off as the " lift " increases, and it follows that eventually the " lift " may be such that the oil cannot be delivered in sufficient amount.

Excessive wear may thus result from the use of a yarn which will not lift the oil out of a given reservoir; it should be remembered, too, that the oil has to be lifted when the reservoir is nearly empty as well as when it is full. Cases have been known where the syphoning action stopped for this reason before the reservoir was emptied, since the " lift " then became too great for the wick which was in use. It follows that shallow reservoirs are preferable to deep oil reservoirs on wick-feed lubricators, to minimize any risk of this type of failure. Furthermore, if there is any doubt about the quality of a wick which it is proposed to use, it is well worth while carrying out a simple trial of its capacity to deliver the lubricant. Another point is that wicks, yarns, etc., tend to absorb moisture if exposed to the air, and this often lessens their oil-carrying capacity. Thorough cleaning and drying of the material first will combat this possibility, and a further safeguard is to follow this drying by soaking the wick in the lubricant with which it is to be used.

The Ring-Oiled Bearing

The ring-oiled bearing is widely employed on line shafting bearings, in electric generators and motors, in centrifugal pumps, and various other classes of machinery. But the fact that this type of bearing can work for prolonged periods with little attention often results in practice in neglect of the bearing, and many failures have occurred simply due to lack of occasional inspection and attention. Faulty lubrication causes over-heating of the bearing, and this may be sufficiently serious to cause dropping of shafts, when complete failure of a machine may arise, as in the case of electric motors when fouling of armature and pole pieces, or rotor and stator, will lead to failure of insulation.

Any condition which prevents or tends to slow up the rotation of the oiling rings will either prevent the lubrication or will reduce the amount of oil delivered to the bearing and thus cause less lubrication. The ring or rings lift up oil from the well reservoir in the housing and deliver it to the working parts; therefore any condition which interferes with this action needs to be avoided. This trouble can arise as a result of deterioration of the oil. The oil in the well or reservoir requires renewal periodically, since it will gradually thicken and accumulate sludge. This fact points to the value of at least occasional inspection of the bearing, since the rate of ring rotation will tend to decrease in proportion to the thickening and after a while the resistance imposed by the thick oil may be such that the rings cannot rotate at all. A gradual loss of lubrication, eventually amounting to complete stoppage, is therefore probable in the case of continued neglect of a ring-oiled bearing. Regular inspection is desirable to combat this aspect, especially since deterioration will increase rapidly once it begins; when reduced oil is carried up to the working parts overheating occurs, so that the oxidation of the oil is increased and therefore the thickening also.

Renewal of Oil

Regular renewal of the oil is desirable. Service deterioration can be minimised by using the best quality straight mineral oil of suitable body for the equipment concerned; animal and vegetable oils, or compounded oils, containing fatty ingredients, are particularly prone to oxidise and, apart from the thickening involved in oxidation, organic acids are also produced which corrode bearings and increase the sludge formation. Even with the best oil for first-class lubrication it is advisable to renew the oil every six weeks; service periods longer than three months have often been found to result in serious trouble. There is also an optimum oil level—viz., just above the inside of the lowest section of the rings. Low oil means inadequate lubrication; high oil means increased resistance and possibly retarded ring rotation, again resulting in poor lubrication. Leakage from a ring-oiled bearing should receive immediate attention, since it may lead to such loss of oil level in the well that lubricating action ceases. In cold situations, the oil may be very thick early in the morning, and in a number of instances bearing failures have resulted from this thickness being too much for the rings. One remedy is to file a few notches on the inside of rings to help them start under such circumstances, but it is better to use an oil with a lower " setting " point which is not so thick on cold mornings.

Lubricator Pumps

Mechanical force feed lubricators usually employ pumps of the piston or plunger type, a number of such pumping elements generally being incorporated in one unit. Then by some actuation such as an eccentric or cam driven by an exterior operating mechanism, individual pistons and cylinders can be operated to deliver oil to a number of points on the machine which is being lubricated. Operation of the lubricator can be effected in various ways by direct, reduction, or reciprocating drives. While it is practicable to drive force-feed mechanical lubricators by an electric motor or some other auxiliary means, it is wiser to drive it from the machinery it is intended to serve. The latter method has the great advantage that the lubricator pumps oil as soon as the machine starts working, and periods of initial running without oil (and consequently with excessive metal wear) are eliminated. Further points are that the lubricator runs at a speed corresponding with the machine speed, and supplies lubricant accordingly. Also, one is not faced with the risk that operators will forget to start auxiliary driving mechanisms for the lubricator when the machine is started working.

Maintenance of Pumps

The working pressures of these pumps are of the order of 2,000 to 5,000 lb. per sq. in., so it will be realised that lubrication will be efficient and unlikely to be interrupted by blockage of lubrication channels. Various refinements and adjustments are provided on the different makes of this type of equipment, and in general it may be said that these lubricators handle all types of lubrication problems, large and small, very reliably and efficiently. Some maintenance work is necessary, however. In this connection it should be noted that while the mechanism is automatic the filter will not necessarily operate for ever. It should be cleaned regularly and the gauze renewed occasionally. Where the oil circulates over and over again, it, too, should be changed at intervals. The frequency of oil change depends upon the type of machine and the efficiency of any filter arrangements in preventing contamination of the oil during service. It is unwise to assume arbitrarily that change of oil after a certain length of running will be sufficient. The controlling factors—extent to which dirt and dust are present, bearing pressures, the tightness of the system, rate of oil circulation, possible contamination with water, operating speeds and temperatures, and original quality of the oil—will make the period which can be run without renewal a purely individual time. Periodical examination of the oil is desirable to decide when renewal is advisable. It should be possible to flush out individual oil feed lines, and also to drain the whole lubricator periodically via a drain plug. These points are of assistance in cleaning and keeping the lubrication system in good order. As a rule the working parts of the pump are totally immersed in oil so that long life of the unit is ensured.

LUBRICATION

A SYMPOSIUM

Some representative plant for the recovery of used lubricating oil and other items connected with lubrication are described in this Symposium.

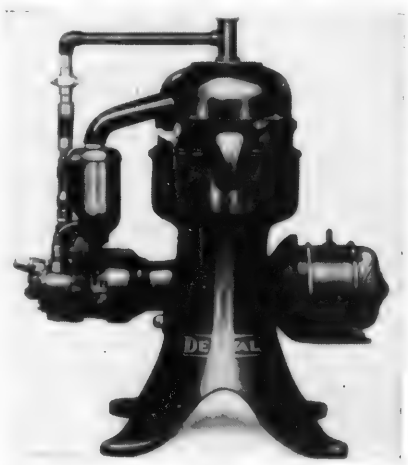
THE RECOVERY OF USED LUBRICATING OIL

THE ESSENTIAL feature of any lubricating system is that a plentiful supply of clean lubricant is available at all times at the bearing surface. This condition can only be fulfilled if either the lubricant is frequently renewed or else an efficient purification plant is installed. National economy in war-time makes it essential to conserve supplies of oils and other lubricants, and hence oil purification and reclamation plants are a necessary auxiliary in all works and factories where machinery is operating.

Centrifugal Purifiers

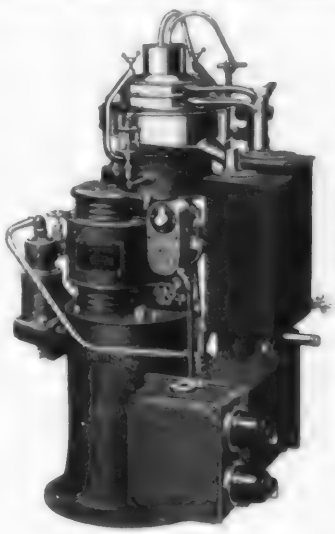
A typical De Laval Lubricating Oil Purifier of the centrifugal type is shown in the illustration; these machines are manufactured for capacities ranging from 5 to 2,000 gallons per hour.

For steam turbine and diesel plants, rolling mills, paper-making machines, machine shops operating large batteries of automatics, etc., it is usual to couple up a purifier directly to the lubricating system. The purifier operates continuously—usually on a by-pass circuit—hence a constant supply of purified lubricating oil is fed at all times to the machines. This is the ideal system, but with smaller plants and in the case of road vehicles, etc., such a plant is not possible, and therefore a batch-cleaning installation is generally adopted. This usually comprises two tanks, one for dirty and one for clean oil; the centrifugal purifier; heater; and one or more pumps. Oil is drawn off periodically from the lubricating system and replaced by reconditioned oil. Generally about 85 per cent. recovery of oil can be effected, so that the double advantage of a plentiful supply of clean oil and a considerable saving in costs for new oil is obtained. The cost of reconditioning depends upon the nature of the oil and the size of the plant, but is generally 1d. or 2d. per gallon.



Centrifugal purification of lubricating oils is exemplified by the range of machines standardised by Hopkinsons, Ltd., and available in both the stationary and portable types.

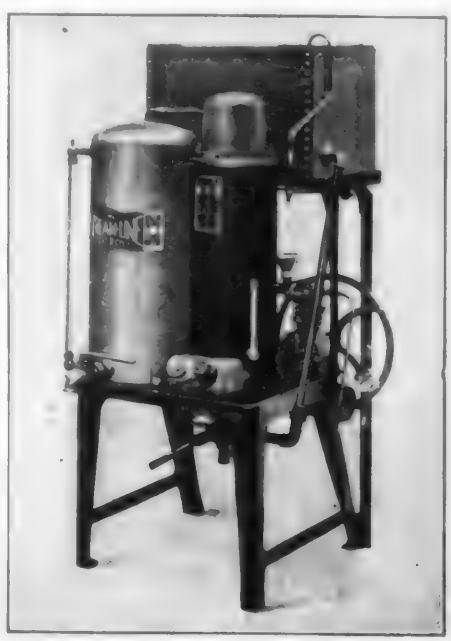
The dirty oil fed into the machine flows down a central tube and is passed through a water seal in the zone where the maximum centrifugal force is available. Under the action of this force the water and impurities, being heavier than the oil, flow outwards, while the oil, being lighter, flows inwards through a set of separating cones. During the passage of the oil through the water seal, the machine removes the carbon, sludge and other finer impurities usually found in lubricating oils. Having passed through the water seal, the oil flows upwards through a series of conical separating discs, where it is divided into a number of comparatively thin films. In this form the minute particles of dirt have only a small radial distance to travel before they strike the under surface of one of the separating discs, the particles thus separated being forced downwards. The clean oil flows inwards to the clean oil channels outside the centre tube, and then upwards through the tubular portion of the top sealing cone, at the top edge of which it is spun off into the clean oil tray.



In addition to the fullest use of maximum centrifugal force, other important features of Hopkinsons' purifiers are positive drive from the motor, ball-bearings to take thrust and radial loads, integral drip-proof motor, and all parts of the bowl protected against corrosion. Stationary and portable machines, with a wide range of capacities, are manufactured.

LUBRICATING OIL FILTRATION

In connection with internal combustion engines the purification of used lubricating oil has considerable economic significance, for two distinct reasons. In the first place, oil after proper filtration can be re-used over and over again for its original purpose, and the saving thus effected means a significant reduction in engine running costs. Secondly, the availability of means for oil-cleaning always encourages the maintenance of a better average condition for the oil actually in use, with a resultant reduction in engine wear



and tear, which is even more important than the direct saving in lubricating costs.

With regard to the saving of oil, war-time conditions have underlined the necessity for the careful use of an entirely imported commodity; but even under more normal conditions no oil user can really afford to overlook the fact that a filter of the right size and type will pay for itself out of oil savings in a few months.

In connection with reduction of engine wear, a filter may be applied in one of two main ways, either as an attachment to the individual engine or as a self-contained unit for dealing with batches of oil from various engines. The attachment filter (usually fitted on a by-pass to the main oil-circulating system) ensures that the oil is always kept in good order, and obviates the necessity for sump-draining. The self-contained unit, on the other hand, can deal with oil from a variety of sources, and its use will result in good engine conditions provided that frequent sump-draining is organised. Which arrangement is adopted will depend on circumstances. A few vehicles or one or two stationary diesel engines will usually best be suited by attachment filters; whereas a large fleet or a large engine-room may well be more economically served by a self-contained batch filter.

The streamline filter is available in both forms and the basic filtration is the same for both. The actual filtering medium consists of a number of columns of discs of specially prepared paper mounted on square rods and subjected to considerable end pressure. The oil is forced between the discs, clean oil passing out through the central clearance between the square rods and the round holes in the discs. Impurities are retained at the paper edges, not even the smallest particles being able to penetrate the microscopically small spaces between consecutive papers, so that the process is literally one of pure edge filtration. The accumulated solids can be removed once a day by a simple process of reversal with compressed air.

COLLOIDAL GRAPHITE

Because of its ability to lubricate at high temperatures, at high loads and under varying conditions, colloidal graphite is employed in a number of industries, ranging from the heaviest plant down to the care of the most delicate instruments.

The reason why graphite is such an excellent lubricant is that the atomic structure of the substance is made up as shown in the figure. The sheetlike structure enables graphite particles to slip into thin plates when rubbed, and in doing so they provide excellent lubrication. An important requirement is that the graphite should be of the highest purity and as finely divided as possible so that it can be dispersed in various liquids such as lubricating oil. This has been accomplished by colloidalising a pure product which is known to plant engineers in the form of "dag", colloidal graphite in oil.

From the point of view of the food manufacturer, colloidal graphite is particularly useful in so far as it enables high temperature lubrication to be carried out efficiently and with minimum oil or grease. Again, the presence of colloidal graphite enables a reduction in oil feed to be made where excess oil to a bearing is to be avoided.

Oil containing colloidal graphite has been used for some years on the moving parts of ovens where clearly too much lubricant would evaporate and cause contamination. Recently, E. G. Acheson, Ltd., have introduced their colloidal graphite as a dispersion in various volatile carriers such as acetone, carbon tetrachloride, white spirit and benzene. These are particularly useful in that they enable graphite coatings to be formed on the rubbing surfaces of equipment and permit, in some cases, lubrication in the absence of oil.

When these volatile dispersions are painted or sprayed on to a metallic face the carrier evaporates, to leave a slippery film of graphite which can then be dried or polished. A particular advantage of colloidal graphite is that it resists high temperatures and when used in oil permits the latter to carry higher loads.

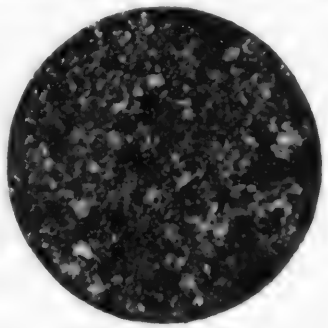
"Aquadag", the dispersion of colloidal graphite in water, is used for steam cylinder lubrication to prevent threads on plant from seizing due to heat and moisture, and for a number of other applications it has proved a valuable solution to the problem of lubrication where oil is undesirable.

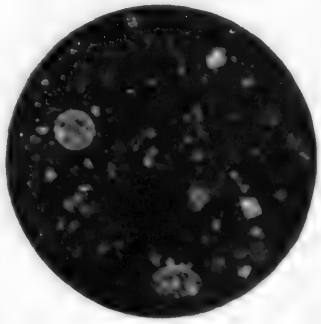
Batch Filtration

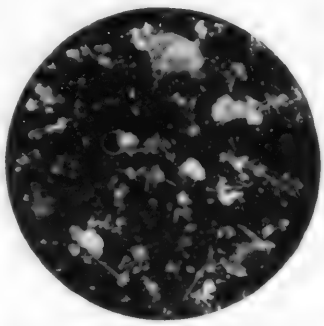
The illustration shows a batch filter of moderate size. Dirty oil is placed in the top rectangular tank. Vacuum created by the small electrically driven pump draws the oil through the filter elements in the right-hand cylinder and clean oil is collected in the vacuum receiver on the left. Simple movement of the control lever beneath the filter body results in the ejection of impurities, the same pump serving as a compressor for this purpose.

Used oil, after filtration through a Metafilter, retains all its lubricating properties.

Very great saving in the cost of lubricating oil is effected immediately by using these filters, but this is the least of the advantages they confer. Vehicles may be kept on the road more continuously and time off for breakdowns due to wear of big-ends, bearings and choking of oil passages is practically avoided altogether. This is of very great importance in war-time. The saving effected in keeping a vehicle on the road instead of having to lay it up for repairs, even for a day or two, is great enough to justify the outlay for installation and operation of such a filter.







The filtering medium used, Metafilter pockets, is not simply paper but a special cellulose material incorporating Metasil filtering medium. This provides an extremely searching filtration, the same medium being used for the production of sterile liquids.

The photomicrographs, which are 220 diameter magnification or 48,400 times natural size, illustrate the fineness of the particles constituting the filtering medium. From these it will be appreciated why the filter will remove microscopic particles, including colloidal carbon, from oil and render it perfectly clear.

Filters work either with compressed air or a pump. The latter type incorporates a special high-rate heater to drive off the lighter fractions caused by fuel dilution. This fuel dilution is, however, under English operating conditions, very slight, and if sump contents are drained with reasonable frequency does not normally justify the additional expense and complication of a fuel eliminator.

Different sized filters provide for a large range of output; the smallest will produce about 1 gallon in 24 hours, and other types have an output up to 40 gallons per 24-hour day.

The cost of recovery per gallon of oil is very low, but naturally varies according to the condition of the oil being treated. The use of a Metafilter to recover oil makes frequent change of oil an economical proposition; further, if the oil is changed frequently, it filters very freely and the cost of recovery is correspondingly less. If discarded oil has been allowed to accumulate, it is advisable, before filtering, to allow it to settle and then decant the oil, leaving the bulk of the dirt and any settled water in the bottom of the container.

The applications of the filter not only cover the recovery of motor vehicle sump oil but also all lubricating oils, edible oils, fuel oils and insulating oils.

"BOUNDARY," "FILM," AND "GREASE" LUBRICATION

It is generally accepted that lubrication falls into three categories—viz., "Boundary" lubrication, "Film" lubrication and "Grease" lubrication.

"Boundary" lubrication is the condition that exists between the rubbing parts of a bearing when the surfaces are just oily without being flooded. Lubrication under these conditions depends greatly upon the material of the bearing surfaces and the chemical nature of the lubricant. For instance, rape seed and castor oil are more highly efficient than "straight" mineral oil. Under these conditions the frictional heat is not being carried away from the bearing by circulation of the oil and the state where "seizure" is quickly reached.

"Film" lubrication exists when an adequate supply of oil is available on the lightly loaded side of a bearing and the speed of rotation is sufficiently high. The adhesion of oil to the rotating shaft forms a film of oil between shaft and bearing which completely separates the bearing surfaces and supports the load. This film is believed to be about 0·0001 of an inch thick and the oil pressure generally at the point of maximum load is often very high. To prevent this oil film from escaping the bearing surfaces must be continuous—that is, free from grooves or vent holes. A means of oil circulation must also be provided which tends to eliminate the frictional heat in the oil film.

Grease Lubrication

With "grease" lubrication the oil film can only separate the bearing surfaces completely when for a given load the rubbing velocity between the faces is sufficiently high. Grease differs from oils in that they are not simply highly viscous liquids but are actually extremely plastic solids, and a minimum pressure must be reached before grease can flow through a channel of any given dimensions, and this pressure becomes higher as the channel section becomes smaller. Thus the flow of grease through a few thousandths of an inch clearance in a bearing may require pressures of several hundred lbs. per sq. in. before flow commences. A grease film once formed between the bearing surfaces will support loads of several hundred lbs. per sq. in. without the grease being squeezed out of the bearing. Such a grease film can only be fed into the bearing at a higher pressure than the load values, and it is primarily for this reason that grease guns have been developed capable of generating pressures as high as 5,000 lbs. per sq. in. and even up to double that amount. A mechanical pump by Tecalemit, Ltd., is shown in the illustration.

FOOD-POISONING EPIDEMICS

A NUMBER of food-poisoning epidemics of the paratyphoid type has recently been reported from various parts of the country. It is understood that in a considerable proportion of the cases synthetic cream was suspected as being the cause.

While this cream is a valuable war-time substitute for cream or artificial cream made from butter it is unfortunately liable to act as a good medium for the growth of bacteria, consequently the greatest care is necessary to prevent infection with undesirable microbes during its preparation.

Bacteria may be introduced in some or all of the following ways:

(*a*) By the use of infected materials.
(*b*) By improperly cleansed plant or containers.
(*c*) By the hands and clothing of the workers.

Infected Materials

The organisms in most of these are generally of a harmless nature, though they are a common cause of souring.

(1) Cereals contain putrefactive and fermentative forms.

(2) Egg materials are liable to contain coliform organisms which may or may not be derived from fæcal matter. Ducks' eggs have occasionally been found to contain bacteria of the food-poisoning type and should, therefore, never be consumed in an uncooked condition.

(3) Fats which have been refined or hardened are sterile, but may become infected through careless handling.

(4) Gelatin is seldom sterile.

(5) Water: towns' supplies are practically sterile when drawn direct from mains. If from tanks there is a possibility of the water becoming contaminated unless the tanks are well covered.

(6) Refined or white sugar and good quality colouring substances should be reasonably free from objectionable bacteria. Lower grade sugars may, however, contain fermentative organisms, including bacteria, yeasts and torulæ.

Plant

(1) Manufacturers should be aware of the necessity for the thorough sterilisation of their plant after use. If allowed to stand idle for a day or two it should be again sterilised before use, as there is always danger of material remaining in dead ends, etc. In such cases serious contamination might otherwise occur. The design of the plant should be carefully considered to ensure easy and complete cleansing and sterilisation.

(2) Pasteurisation or sterilisation temperatures should be carefully checked.

The minimum temperatures are higher than those used for milk and much higher temperatures may be used without risk of spoiling the final product.

Pasteurisation should be carried out at not less than 160° F., for at least 30 mins., or 175° F. for 15 seconds, or 180° F. for a few seconds if pathogenic organisms are to be destroyed.

(3) Homogenisers and coolers have frequently been found to be sources of contamination. They require as thorough cleansing as other portions of the plant.

(4) Containers though not visibly dirty are never sterile on receipt.

Human Agencies

(1) The touching of the finished product by workers either with their hands or their clothing—*i.e.*, after the cream has been sterilised or opened in bakeries, may introduce disease germs. Typhoid and food-poisoning organisms may be transferred to the product by "carriers" or convalescents from diseases of intestinal origin.

This is one of the most common causes of food-poisoning epidemics.

(2) Sufferers from diphtheria, scarlet fever and streptococcal sore throat may infect cream by coughing or sneezing.

(3) Coli organisms have been found in samples of cream. These suggest contamination by excreta, probably from the hands of the worker.

Precautionary Measures

Heat treatment destroys most of the pathogenic organisms, but if the cream becomes infected after pasteurisation the organisms will multiply more or less rapidly according to the temperature of storage. In warm bakeries multiplication will be

(*Continued on page* 230)

BOILER FEED WATER TREATMENT

F. KENYON, A.I.C.

ALL WATERS, whatever their source, are at some time or another subject to variation in the dissolved material they contain. Boiler feed waters are no exception to this general statement, and freedom from troubles on steam raising and consuming plant depends, to a large extent, upon the means adopted to counteract any change in local water conditions. Possible causes of stoppages will be classified under three headings, the Feed System, including Economiser, the Boiler Units, including Superheater, and the Steam and Condensate Lines.

The Feed Water System

Troubles here may be due to scale formation, corrosion, or to both. Scale may show itself in feed heaters and economisers, and its composition is usually carbonate of lime alone or knit together with varying amounts of sulphate of lime and or silicate of magnesia. The carbonate of lime, of course, originates from the temporary hardness in the feed water, and is thrown out of solution as the temperature rises, usually at the outlet stages of heaters and economisers. This particular type of scale formation is by no means rare when lime-soda softening plants are used for the make-up of feed waters. Unless careful and constant check is kept on these plants, unsatisfactory softened water results, and "after-softening" and carbonate silicate scales form in the feed system.

Many feed water conditioning systems have been designed to maintain boiler feed lines in a clean condition, and one which is claiming particular success makes use of colloidal phosphates. These latter are soluble in water and their composition depends upon the characteristics of the feed water and the type of plant. The phosphates prevent deposition of silicate and sulphate scales, whilst the colloid keeps any temporary hardness in solution until the water reaches the boiler. As previously indicated, lime-soda softened water is not always a satisfactory feed, and further "supplementary" conditioning is often well worth while. At the other extreme, where "make-up" is 100 per cent., and consists of water containing much dissolved matter, this type of "internal" conditioning can and is being used with success. Scale and corrosion in feed pumps are also satisfactorily catered for in most conditioning treatments. It may be that minute amounts of free CO_2 gas are being liberated in the pump with consequent corrosion of valve gear or impellers. This type of attack is aggravated by the presence of dissolved oxygen in the feed, but colloids with high oxygen absorption values have been proved to prevent this, whilst the phosphates, in conjunction with the colloid, will maintain pumps free from scale and deposit. A further point is that the *p*H value of the feed water is increased, thus minimising corrosion in economisers, etc.

Scale Prevention and Removal in Boilers

Maintenance of clean heating surfaces by correct feed water conditioning can be accomplished, together with an efficient feed system, as well as pure steam and a neutral and non-corrosive condensate. Objections are always raised about making the boiler the softener, but the fact remains that in spite of various prejudices "internal" conditioning is rapidly gaining ground. Colloidal phosphate conditioning will prevent scale formation in the boiler units, and produce a free-flowing sludge, removable by routine blowing-down. Alkalinities in the boiler water are also controlled to prevent corrosion, and also to take care of any tendency to prime. Further than this, slight "over-treatment" with the conditioning chemicals will gradually remove scale in the boiler shells, tubes, etc., whilst the units are steaming. This, naturally, will be a comparatively slow process, but, of course, apart from possibilities of overheating, etc., shut downs for cleaning will be avoided. CO_2 and oxygen in the steam are responsible for corrosive attack on tubes at the "wet" end of superheaters, and as previously mentioned, any efficient colloid will absorb the oxygen, whilst correct conditioning will either eliminate or neutralise the free CO_2.

Corrosion in Steam and Condensate Lines

This is invariably due to free CO_2, assisted by oxygen, coming over with the steam and redissolving in the condensate. Minute amounts of CO_2 lower the *p*H value and an acid water is formed. Not only are condensate lines attacked, even when these are made of copper, but often rapid corrosion takes place in calorifiers, traps, pumps, etc. The illustration shows a section of condensate line, and attack will be noted along two-load periods. The corrosion resulted after only six months of service, and was due to the presence of free CO_2 in the condensate. This gas CO_2 is sometimes present in the free condition in a water, but is more usually derived from the temporary hardness. Base exchange softening may produce a zero hard water and thus eliminate scale formation, but the possibilities of an acid steam are not removed. The temporary hardness is converted by this softening process into bicarbonate of soda, which liberates CO_2 in the boiler, to cause corrosion at the points already mentioned.

FOOD-POISONING EPIDEMICS

(*Continued from page 220*)

rapid. The following measures should be adopted to prevent infection :

(1) Frequent conscientious cleaning and sterilisation of all equipment. This is as essential as in milk establishments.

(2) Sterilisation or pasteurisation of the cream.

(3) Efficient cooling.

(4) Sterilisation of final containers. A clean product in an infected tin is hardly justifiable.

(5) Cleanliness of the workers. Washing facilities, as required by law (Section 13, F. & D. Acts, 1938), must be available and should be used. All workers leaving their work temporarily should be made to wash their hands thoroughly before returning to it.

(6) Laboratory supervision and frequent sampling. Samples at various stages in the process are enlightening, if the final product is unsatisfactory.

(7) Proper care of cream on receipt at the bakery. Cream should be kept cold, and used promptly. Clean handling (see 5 above) and clean spoons and utensils are essential to prevent rapid souring and the risk of infection.

If these precautions are conscientiously carried out a better keeping product should result, and there should be much less loss from spoilage.

Further, there should be freedom from the risks of claims for compensation and the resultant loss of trade not only to the individual manufacturer but to all engaged in this trade.

PLANT DEPRECIATION IN WAR TIME

The progress of the war and in particular the over-running of most of Europe by the enemy, as well as the actions against our merchant shipping, has thrown a much greater load on to the manufacturers of food. This extra burden, coupled with the efforts made by the manufacturers to bring supply in line with demand, has entailed a great strain being placed on plant and machinery.

K. BERNARD WISE

CUSTOM, coupled with the requirement that shareholders shall be adequately secured for their investments, demands that the asset items constituted by plant and machinery are subjected to regular devaluation. A food manufacturer who purchases new plant for the development of output is able to obtain from the machinery manufacturer an estimate of the possible machinery life period. That estimate is readily given on the assumption that the machinery will be expected to stand up to not more than " reasonable " usage, a condition which no longer obtains. The war and the increased pressure of greater productive capacities have removed all possibility of " reasonable " usage and has forced the plant owner to consider, from the accountancy standpoint, the rapidly depreciating values of his plant assets.

Before the outbreak of war it was a matter of comparative simplicity for any manufacturer of food products who found his plant ageing or operating uneconomically, to effect an entire or partial replacement, and in his annual balance-sheet he would show the net result of a substantial reduction on the previous year's values plus the amount of the capital expended on the new acquisition. To-day, such simple procedure is not capable of equal execution, for when it is thought that plant calls for replacement the application for acquisition must be so framed as to bring it within one of the following groupings :

1. That existing plant has become obsolete or has reached the end of its life.
2. That existing plant is of too limited a size and demands extension.
3. That new plant alone can enable the manufacture of new products or alternatively that it is only new plant which can permit the realisation of increased turnovers which larger trade and larger orders have brought.
4. That extensive overhauls are essential, but that actual replacement requirements are on a relatively small scale.

Manifold difficulties are rightly put in the way of plant acquisition, and consequently machinery which has been in operation for some time and which has to continue to work must depreciate in terms of capital value at a much advanced rate.

Depreciation Allowances

In peace-time it was customary to effect depreciation allowances in one of two major ways. The first was to deduct annually an amount equivalent to that fraction of the original purchase price which a twelvemonth bore to the estimated existence. The alternative basis was to predetermine a percentage of depreciation which would in effect bring about greater deductions during the early years of use when the efficiency ratio was high, and enforce lesser deductions on advancing age when serviceability became low and maintenance costs increased.

There has always been the ever present possibility that scientific developments would bring on to the market machinery which, when in operation, would execute certain work at a lower economic cost than previously acquired plant. In such circumstances it is frequently found beneficial to scrap entirely the old plant (although it may still have a fair proportion of its life still to expire) and replace it with new. Complete reinstallation is also recommendable when the cost of maintenance and replacements exceeds the economic value of that labour and outlay.

When industrial conditions were normal, food manufacturing machinery was expected to stand up to a working week of between 48 and 50 hours. Such periods of active occupation allowed ample periods of rest and ample servicing by skilled technicians allocated to that particular task. Such peace-time activity normally called for an annual depreciation allowance (effected irrespective of whether the trading results showed a profit or a loss) of between 7½ and 10 per cent. The conditions of to-day require that much more substantial allocations are made.

The impetus handed to the food manufacturing industry by the prosecution of the war programmes and the demands made on it for the replacement of lost markets and losses in shipment have necessitated the employment of plant to a degree never previously entertained. Whereas 48 or 50 hours was normal, double shifts—say, 100 hours—are to-day the rule, and even longer hours are not regarded as being particularly exceptional. It would be entirely fallacious to assume that the rate of depreciation increases in direct proportion to the extra number of hours for which plant is operated, although, of course, the hours of operation figure principally in the correct calculation.

Machinery which is continuously employed must necessarily depreciate with greater rapidity than that which is allowed regular rest periods. Steel which is not provided with regular and maintained intervals of inactivity will become tired : machinery which is deprived of ample and requisite servicing by skilled mechanics must age rapidly. It is consequently obvious that the basis of earlier depreciation allowances must undergo fundamental and drastic alterations : 7½ to 10 per cent. is no longer an adequate percentage representation of the value-loss following a year's operations.

Those plants which are now operating on a double shift basis must (to maintain in this direction their domestic financial equilibrium) effect a depreciation deduction of approximately 25 per cent., whilst those factories operating almost continuously will require to make an allowance of about 39 to 41 per cent. per annum to counter their loss in balance sheet nominal values. The percentages are minima which are possible of maintenance only by the insistence of regular periods of shutting down in rotation for complete overhaul in place of the scrappy maintenance which, in many cases, is the best to-day available.

Depreciation and Income Tax

The discussion of depreciation allowances must include some reference to the allowances granted by the Inland Revenue in the calculation of income-tax payable. The Authorities have always recognised a certain annual deduction for depreciation, but that which has, in the past, been regarded as an equitable allowance is, to-day, little more than a jumping-off ground for fresh negotiations. Specific cases have been placed before the Inland Revenue and their guidance and instruction sought and the Authorities, whilst appreciating the reasoning and the arguments put forward are, very naturally, not prepared to agree to augmented allowances on such an important question without such requests being accompanied by reliable statistical support. Those who have still to draw up their annual figures and who have as yet not approached the Inland Revenue for improved depreciation deductions should go into the question of operating hours and quantitative output with all thoroughness in order that they, or their accountants, when broaching the subject, can proffer data in support of their arguments and appeals. It is perhaps superfluous to add that such data must be capable of verification. The most optimistic manufacturer of food will hardly anticipate the immediate approval of all he asks of the Inland Revenue Authorities in respect of the extra depreciation which his machinery and plant has sustained owing to war-time activity and pressure, but experience has already clearly demonstrated that the Authorities do appreciate the claims which manufacturers are making on them and are prepared to agree to the allocation of substantially larger allowances to plant depreciation than it has been their custom to accord in the years before the war.

Costed Contracts

In conclusion it may also be pointed out that this problem of excessive depreciation and the accompanying rise in overhead charges generally is one that can, and should, be thrashed out and agreed with Government accountants when endeavours are being made to come to agreement on production costs in the case of costed contracts.

PLANT AND EQUIPMENT FOR THE FOOD INDUSTRY

British manufacture and economical operations are essential specifications in war-time food plant and accessories. The following notes summarise some new developments.

Moisture Removal by Adsorption

REMOVAL of moisture by refrigeration provides a suitable solution for many problems requiring average conditions of humidity and a low dry-bulb temperature. However, in a large number of cases a very low humidity is required together with a moderate temperature, and for many such cases refrigeration cannot remove sufficient moisture. A piece of equipment called the Lectrodryer offers one solution.

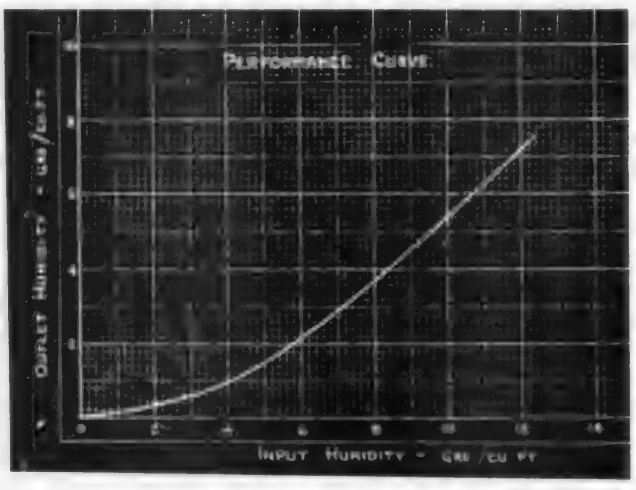
This is a drying unit which extracts moisture by adsorption on activated alumina. The extent of the removal by the standard "C" or air-conditioning type units is shown by the accompanying graph. For example, with an input of 4 gns./ft.^{3} the output will be 1 gn./ft.^{3}, which represents at a dry-bulb temperature of 70° F. a relative humidity of 12·5 per cent. This is a very satisfactory figure for most applications, but if recirculation of the conditioned air is employed the input moisture content will in general be lowered, so that the moisture content of the dried air will be still further reduced.

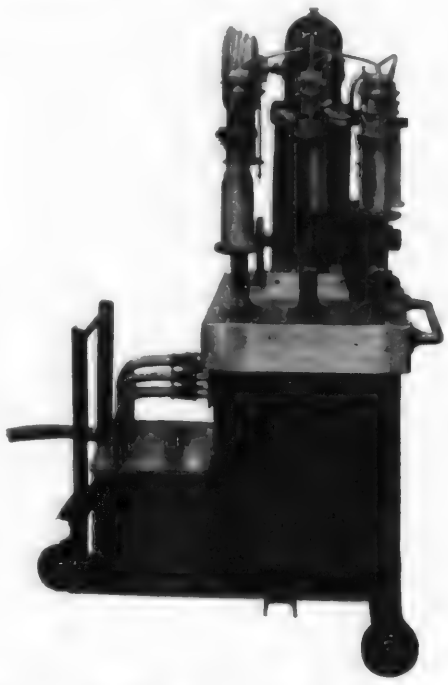
These units are designed primarily as dehumidifying units—not as complete air-conditioning installations—and supply a warm dry air. However, the standard units are fitted with cooling coils to reduce this warm air to within 10° to 15° of the available cooling water temperature, which in many cases may provide adequate cooling for comfort conditions. When the air is required warm as well as dry they provide a complete solution. Further, they may be readily incorporated in a complete conditioning scheme. Drying is continuous and the output is maintained at a steady figure.

There is no delicate mechanism and the only moving parts are the fans and valve, so that maintenance is simple. The activated alumina will undergo repeated cycles of reactivation and adsorption without loss of adsorptive efficiency or dusting of particles. Consequently no replacements of adsorbent are necessary and running costs are confined to the cost of power for driving the motors and of heat for reactivation.

There are many applications which suggest themselves, but we may just instance one or two typical examples—the handling and storage of hygroscopic materials in the food, chemical, and pharmaceutical industries, the maintenance of low relative humidity in telephone exchanges, the drying of substances sensitive to high temperatures, the processing and storage of foodstuffs such as sugar, etc.

The Lectrodryer is made by Birmingham Electric Furnaces, Ltd.





Three-Head Model Filling Machine with Automatic Operation (Hand Fed.)

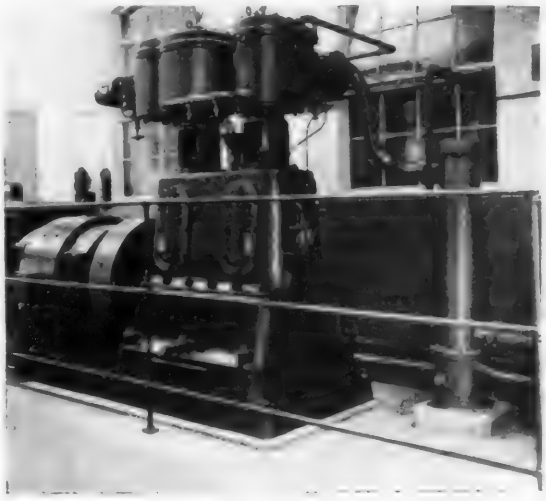
Filling Machines

A machine which works on the vacuum principle, the filling taking place in an entirely enclosed circuit, thereby ensuring that the whole filling operation is completely dustless, is very suitable for packing quantities up to 1¼ lbs. in weight and will handle tins, bottles, cardboard drums, waxed cartons and other containers. Materials which have been very successfully handled include peppers, spices, cornflour and custard powder, milk powder, soup powder and health salts. The hopper of machine is arranged to be filled either by gravity or the supply can be picked up by a hose from any receptacle on the floor level under vacuum.

Vacuum operated filling machines for liquids range from single-head type up to 24-head rotary filler automatic. These machines will handle any product ranging from vinegar up to thick sauces, emulsions, liquid mustard and sweet pickle. The outstanding advantages of these machines is that they fill the bottle to a uniform accurate level in the bottle neck and with complete absence of overflow, waste, spillage or drop, thereby large savings are effected in the saving of material and in the elimination of cleaning the bottles after filling. The largest types of fillers, with a capacity of 900 gallons per hour, are installed in many dairies in this country.

The gravity automatic filling machine is used for packing such substances as syrup, soups and vegetable oils. It will fill an accurate quantity of substance into cans and requires no electrical or other power to operate it. The cut-off of the flow is effected by the filled container causing the weighing scale to descend and bringing into operation a hardened steel trip.

All the machines mentioned above are made by Albro Fillers and Engineering Co., Ltd.



Air Compressors and Vacuum Pumps

For vacuum and for pressures up to 30 lbs. per sq. in., "Broomwade" rotary machines are of a very simple design. They are of the "crescent" type, consisting merely of a slotted rotor carrying loosely fitted blades of special material, mounted eccentrically in a "stator" of larger diameter. Direct coupling to motors or other high-speed prime movers is permissible, resulting in low first cost and small overall dimensions. Machines for continuous running are water-cooled and fitted with mechanical lubricators. An alternative air-cooled, wick-lubricated machine is suitable for lower pressures or intermittent duties.

When air pressures up to 100 lbs. per sq. in. are called for the piston type machines are recommended. These consist of both single- and doubt-acting designs, and single- or two-stage, depending on the capacity and pressure required. Small units up to 40 cu. ft. per minute displacement can be either air or water cooled, but above this capacity water cooling is standard. All except the two smallest sizes (2 in. by 2 in. and 2⅜ in. by 2½ in.) are arranged with forced lubrication from valveless plunger type pumps. They are also provided with automatic air governors, which unload the machine at any desired maximum pressure. Alternatively, fully automatic electric control gear can be supplied which stops and starts the motor at any predetermined maximum and minimum air pressures.

An advantage of the piston-type machine is that if provided with suitable changeover valves and pipe connections, it can be used for either pressure or vacuum duty.

Aftercoolers and air filters are available for use when the compressed air must be absolutely free from entrained oil and moisture, the aftercooler being fitted between the compressor and the air receiver.

The makers are Broom and Wade, Ltd.

Hand Can Sealing Machine

A handy little machine which has just been put on the market, under the name of "Econom", should be of interest to food preserve manufacturers and others.

This is a simple apparatus for closing and sealing tins of all standard sizes. It is a universal machine and works reliably on the same principle as the big automatic closing machines, such as are used by the large preserving firms, but which are now so difficult to obtain.

The machine is operated merely by a few turns of a hand wheel, which brings into action the rollers and seamers. These rollers and seamers are made of special wear-resisting material which is claimed to ensure long service.

It can also be supplied with an attachment for trimming and flangeing used tins, and will thus, by permitting the re-use of old tins, contribute to the war effort.

The apparatus should prove of value not only to makers of preserved foods but also to hospitals, communal kitchens, restaurants, military camps, etc., as well as to works and other canteens, in short, wherever a surplus of food arises, as it enables any rations not used to be tinned and preserved on the spot for future use instead of allowing them to go bad or to be wasted. The suppliers are Richard Brandt.

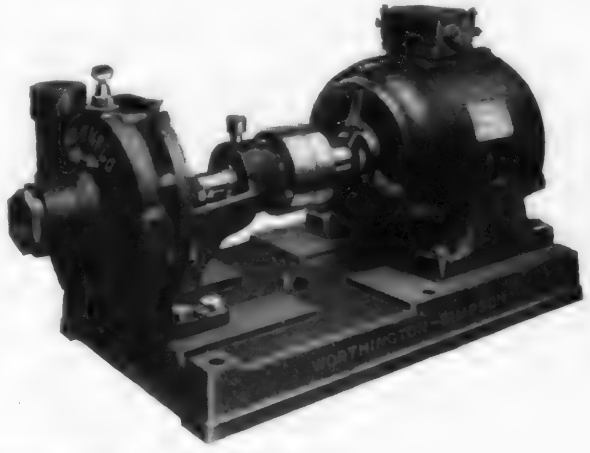
Pumps

In addition to their well-known Duplex Direct-Acting Pumps for general or light service Worthington-Simpson, Ltd., build Vertical Simplex Pumps suitable for boiler feed pressures, with a very ingenious valve motion. This valve gear will allow the speed of the pump to be regulated on the throttle without short stroking. The parts of this gear are so designed that they cannot be wrongly assembled, so that no special skill is required to dismantle the pump for examination and reassemble it for working conditions.

A special line of small Triplex Power Pumps, 2-inch and 3-inch stroke, is built in large batches to cheapen production, and these can be usefully employed for small quantities of liquor at high pressure. The 2-inch stroke pump can be used for A.R.P. or car washing, and the 3-inch stroke can be easily adapted for washing out casks or containers. When used for this purpose it is only necessary to shut the cock on the hose-pipe nozzle to change over to the next cask or container.

This company also supply centrifugal pumps of all types and for all services from 1-inch delivery upwards. One of the small end suction type is shown in the illustration. Several ranges are of the split casing type with the openings arranged on the lower half casing so that the pumps can be easily opened up for examination.

Steam jet air ejectors and surface condensers for high vacuum work on evaporating pans, also heat exchangers and feed water heaters are other items manufactured.



Motor-Driven "SB" Enflo Pump.

Controlled Humidification in the Bakery Industry

Considerable progress has been made by the bakery trade—following the example of the rest of the world, particularly the Americans—in changing over from the use of free steam to correctly designed humidifying plants in the maintenance of controlled humidified conditions in their various processes. The machine which has been greatly responsible for this changeover is described hereunder. Its chief applications have been:

Dough Fermentation Rooms.—Yeast develops best at a temperature of 80° F. with a relative humidity of 65 per cent. to hold the surface of the dough open so that the CO_2 formed by the fermentation may pass out and produce a loaf of bread when baked of fine, even texture without voids.

Prooving Cabinets.—The control of high conditions of temperature and humidity for the prooving of dough prior to baking.

Loaf Storage.—The storage of freshly baked loaves for considerable periods, ensuring their delivery to the consumer in the same condition as they were on leaving the oven. This applies to staleness, general appearance, condition of crust, palate, aroma and its inherent diseases, mould and rope, these latter being in as dormant a condition as when the loaf left the oven, and it approaches staleness only after release and at the same rate as a

freshly baked loaf. The plant can be applied equally to either wrapped or unwrapped bread, but for different reasons. While this latter application is comparativeiy new, it is growing apace in the bakery trade.

The Mellor Bromley type "Bahnson" humidifier owes its parentage to the United States, but has been manufactured and applied by the Air-Conditioning Division of Mellor, Bromley and Co., Ltd., for a considerable number of years, during which time many thousands of these units have been installed in this country alone. One of its greatest features is that it is entirely complete and does not require the aid of any subsidiary equipment.

It consists of a double-ended spindle ¼ h.p. motor, running at a speed of 2,800 r.p.m. and absorbing approximately 1·8 amps., representing a running cost of approximately six hours for 1d. with electricity at 1d. per unit.

On the front of the motor is fitted a revolving disc and to the rear a propeller fan. Water is fed to the disc and sprayed on to a series of fixed teeth. The atomised water is caught by the air movement of the fan and evaporated.

The feature of the unit is the extremely fine nature of the atomised water and the speed with which it is evaporated. There is no free moisture of any kind, the humidity conditions being maintained without any condensation and without its consequent annoyance and dangers.

Each unit is fitted with an automatic humidity control of entirely original design. It controls the amount of water fed to the unit and, being adjustable, maintains any preset condition up to 98 per cent. humidity—that is, within 2 per cent. of saturation within ± 2 per cent.

It will be noted that the high running costs of compressed air are entirely eliminated and, furthermore, there are no water jets to become choked and require frequent cleaning.

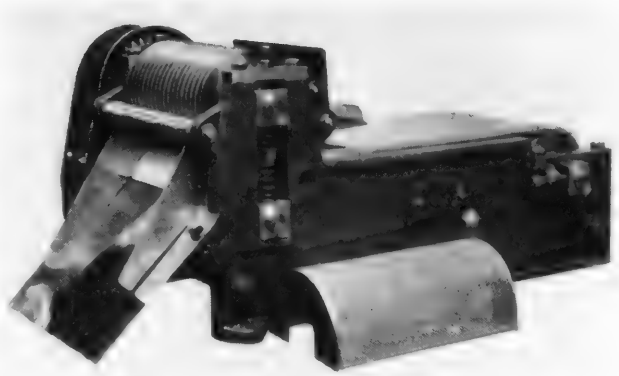
Drying Machines

The duel purpose laboratory model drying machine by Bertrams, Limited, illustrated below has been designed to operate as a twin-cylinder drying machine for free-flowing liquids where the liquid is fed to the top central trough formed by the cylinders, and functions in the usual manner by deposit of a film of liquid on each cylinder which dries in about two-thirds revolution of the cylinders and is scraped off by knives located near the top of the cylinders.

Alternatively, the machine can be used as a single-cylinder machine for viscous liquids fed to a tray or trough located under the machine, in which a lick-up roll revolves and picks up a liquid film which is transferred to the main drying cylinder and scraped off, when dry, by a knife located below the axis of the cylinder.

The direction of rotation of the cylinders is reversible to suit these two operations.

MINIATURE TWIN CYLINDER DRYING MACHINE
CODE WORD-"TWINLABORY."
BERTRAMS LIMITED ENGINEERS SCIENNES, EDINBURGH



Vegetable and Fruit Cutting Machines

Among some of the interesting machines manufactured by William Brierley, Collin and Hartley, Ltd., are included a motor-driven apple peeling and coring machine with an output of twenty-five to thirty apples per minute. Another motor-driven machine slices carrots, turnips, beet, potatoes, rhubarb, etc. A practical little machine for cutting runner beans into pieces of rectangular or diamond shapes of any width is shown in the illustration.

Saving Steel by Use of Glass

Glass may now be used in place of steel for the tops of hot cabinets of the type widely used in works canteens and restaurants.

This is the result of tests carried out by Pilkington Brothers, Ltd., at the request of the Board of Trade, with the object of replacing steel in the making of hot-plates.

Toughened glass can be supplied to withstand extreme changes of temperature, but the new use is confined to hot cabinets normally operating at temperatures of 120° to 150° F.

This new domestic and industrial use of glass, it is stated, not only releases valuable war materials but adds to the efficiency of hot cabinets.

Light is admitted inside the cabinet, thus enabling the food to be seen during cooking and making it easier to clean the cabinet.

The toughened glass takes longer to warm up than steel, but has a lower heat conductivity, which lowers heating costs, particularly where lengths of hot cabinets or batteries of steamers are used. The cost, it is stated, compares favourably with that of the material replaced.

The Board of Trade has drawn the attention of the Catering Equipment Manufacturers' Association to the success of this development.

Electric Unit Heaters

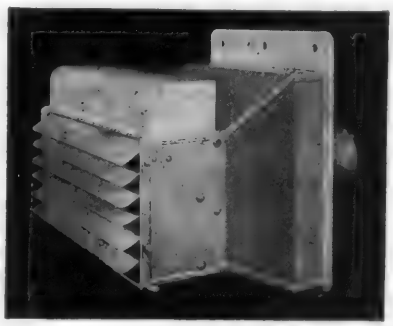
A heating system designed to maintain a given temperature in a factory where the air is changed by natural means twice per hour would be quite inadequate in another factory where the ventilating system changed the air, say, six times per hour. Thus a heating system that is flexible in that it can be extended if necessary after installation, that is efficient, and, above all, that is clean, is ideal both for new and for existing factories.

The electric unit heater system designed and evolved by the General Electric Co., Ltd., possesses all these attributes. In addition, it does not occupy valuable floor space; it can be installed in existing establishments without incurring structural or other major modifications and can be applied in summer to the converse function of circulating air and so assist the normal scheme of ventilation.

This system comprises a number of unit heaters similar to that illustrated, mounted at a predetermined height on each wall.

Enclosed within the sheet steel casing of each unit heater is the heater battery or element and a "Genalex" fan which, being mounted on rubber cushions, is almost mechanically silent. It will be seen, therefore, that working on the principle of forced convection, each unit not only generates heat, it also distributes the heat. By suitable setting of the adjustable louvres and by means of the special centre of gravity mounting, which permits adjustment of the heater on its bracket, the required directional effect can be obtained.

The heater battery is wound for three-phase supply and can be controlled either manually by a triple pole switch fuse, or by a thermostat operating in the coil circuit of a triple pole contactor. With the latter arrangement the air in the room or factory is automatically kept at an even temperature. By a special arrangement of the switch-gear the fan of each unit may be operated independently of the heater battery. Because the heater battery works at black heat and because of the robust electro - mechanical construction of each unit as a whole, maintenance costs are practically negligible.



A Development in Thermostatic Steam Traps

A development of considerable importance to steam trap users is announced by Messrs. Spirax Manufacturing Co., Ltd. It concerns the thermostatic type of steam trap.

Applications for thermostatic traps can be divided roughly into two categories. In one, the trap must discharge condensate as soon as ever it forms (regardless of the waste of heat which must take place when condensate is discharged at steam temperature). In the other, it is practicable and desirable to make the most of the sensible heat units of the condensate before it is drained from the equipment. Traps in this category can be termed "condensate heat user" traps.

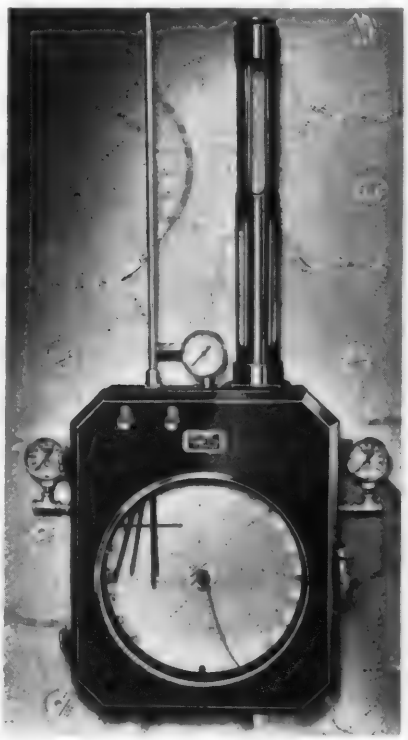
A few trapping applications (examples are unit heaters and sterilisers) may fall into one or other of these categories according to the design of the equipment and their specific duty.

In low-pressure installations, where it is possible and desirable to utilise the sensible heat units of the condensate before discharging it, the standard type of Spirax thermostatic trap is indicated, because it closes and opens again at a temperature well below that of the steam. But, for the same reason, the standard type is not suitable for use on installations in the other category—that is, on equipment which must be drained of condensate as soon as it forms.

For such equipment it is necessary that the trap should discharge condensate at, or nearly at, steam temperature. And that is the reason for the appearance of a new thermostatic element known as the "M" type.

While the standard type of thermostatic trap works more efficiently on certain installations when it is fitted at the end of an adequate collecting leg for condensate, the "M" type trap can be fitted right up against the job. The value of this feature will be fully appreciated by many users of thermostatic steam traps.

To illustrate the usefulness of this "M" type thermostatic trap, suppose we have a steriliser or some similar equipment working at a pressure of (say) 10 lbs. per sq. in. If this equipment is fitted with the standard type (which discharges condensate at some 25° to 30° degrees below steam temperature) inefficient operation probably would result. The reason is that at 10 lbs. pressure steam temperature is 240° F., and it follows that the trap is not able to discharge condensate at a temperature higher than 210° to 215° F. If condensate is being discharged at 215° F., well and good, but at 210° F. the coil in the steriliser is filling up with water at a temperature 2° F. lower than boiling point, and in such circumstances the steriliser cannot, of course, give satisfactory results. On the other hand, if the trap has this new "M" type thermostatic element in it, condensate will be discharged practically at steam temperature (approximately 5° F. below). Thus at 10 lbs. pressure the trap will discharge at 235° F., ensuring perfectly satisfactory operation in the steriliser.



Recording Controller

This instrument, which is made for the control of temperature, pressure, humidity, rate of flow, liquid level, or any combination of two of these, incorporates the "Short and Mason" Universal Sensitivity Adjustment, which enables the correct unit sensitivity for a given application to obtain "throttling" control without "hunting" and give "straight line" control.

Since absolutely identical operating conditions rarely exist in similar pieces of apparatus or at different points in a continuous process, the impracticability of a controller with a limited number of fixed sensitivities is apparent. Compressed air at a steady pressure of 25 lbs./sq. in. is the medium used for operating the diaphragm motor of the valve, lever or switch via the controller.

The Time Schedule Controller, as its name implies, controls temperature, pressure, humidity, rate of flow, liquid level, or any combination of two of them, to a predetermined time schedule. This controller differs from the standard "Fulscope" Recording Controller only in its means of changing the control point. By housing the instrument in two standard cases mounted as a unit, neither is overcrowded. The right-hand case contains the recording controller mechanism, whilst in the left-hand case are the cam, follower arms, trip valves, trip switches, etc.

The "P" Controller operates on the principle that one metal expands or contracts more than another when subjected to the same changes of temperature. It is used, in general, where the point of attachment is accessible for inspecting and setting, where there is sufficient room inside the apparatus to accommodate the controller stem and where the operating temperatures are within its range of 32° to 250° F.

Compressed air at a steady pressure of 25 lbs./per sq. in. is used as medium of operation of the controller.

THE CONTROL OF AIR-CONDITIONING

SPECIALLY CONTRIBUTED

LONG BEFORE we were concerning ourselves about the humidity, or even about the temperature, of our homes, schools, offices and factories, the honey bee was controlling those very conditions in his combined home, office and factory. The temperature of the average hive is regulated by the bees themselves more closely than is that of most modern homes—within two or three degrees, even when the outdoor temperature has a variation of as much as fifty degrees.

During midsummer the temperature for brood rearing is maintained by a corps of " fanners ", this system controlling also the humidity in the hive, removing excess moisture from the nectar, which would ferment if stored immediately as brought from the flowers.

In the winter, life-sustaining temperature in the hive is maintained by the bees themselves; those in the centre of the mass by muscular activity generating sufficient heat, and the outside layer of bees crowd closely together, preventing the escape of heat from the inside.

Modern Air-Conditioning

What the bees accomplish in the conditioning of the air in the hives is nowadays done, in industrial processes and public buildings, by efficient mechanical means. Before describing this in further detail, it is essential to understand the physical laws determining the required conditions of the air. This is the relationship between the dew point temperature (which is the temperature at which saturation of the air is reached without deposition of moisture) and that of the dry bulb temperature, and is used as a basis in air-conditioning plants for obtaining the required percentage of relative humidity in the room or building to be conditioned.

The temperature of the dew point is governed by that of the required dry bulb in order to determine the percentage of relative humidity. The difference in the readings of the wet bulb compared with that of the dry bulb temperature and with reference to psychrometric tables enables the relative humidity conditions of the air to be obtained.

Relative humidity is the ratio of the weight of water vapour in a given space compared with the weight which the same space is capable of containing when fully saturated at the same temperature. It can therefore be seen from the foregoing that by controlling the dew point and the final temperatures of the air delivered by an air-conditioning plant, any desired condition can be obtained.

The " Washer "

An air treatment or conditioning plant consists of a chamber (known as a " washer ") through which the air is drawn by means of a fan. This washer is equipped with a series of water spray nozzles, fed by means of a pump, giving a very finely divided spray in the form of a " curtain " of water through which the air passes. The temperature of this water must be such that, when tempered by the incoming air it provides " saturation " at a given temperature, known as the dew point. To obtain this temperature under all climatic conditions means are provided whereby heating or cooling of the incoming air can be obtained and is known as " humidifying " and " dehumidifying " respectively.

This is accomplished by the heating or cooling of the " spray " water. Having obtained the " saturation " of dew point, any excess water entrained in the air is removed by eliminator plates in the washer. The temperature of the air is then raised by passing through a heater. The fan then delivers this tempered air by means of " ducts " to the space being treated so that the conditions of temperature and relative humidity are those desired.

Maintenance of Constant Conditions

To obtain constant conditions by manual operation of the steam valves to the heaters or of the supply of cooling medium is an impossibility because steady dew point and final or dry bulb temperatures are essential to keep the relative humidity condition constant. It is here that automatic control plays a major part, and it can be stated that " successful air-conditioning is 90 per cent. control ". The usual method is to control the dew point temperature by means of a thermostat placed behind the eliminator plates (*i.e.*, the temperature of the saturated air), which automatically operates a valve on the heater and in some cases also a three-way valve mixing the returned water from the sprays and a supply of cooling water.

Control of Final Temperature

The final temperature is controlled by means of a thermostat placed either in the room or in the extract air, which operates a valve on what is termed the " final heater." This is to give the air its dry bulb temperature. There are many cases in which the relative humidity, rather than final temperature, is of greater importance. In such cases a hygrostat is used to control the final condition. This instrument has an element which is sensitive to any slight change in the moisture condition of the air and can operate within fairly close limits. In some cases of industrial air conditioning for special processes, it is necessary to provide changes to a definite time schedule of either or both the dry bulb and relative humidity conditions. In such cases an instrument is provided with a cam driven by a clock, the cam being cut to the required contour to enable the required changes to be made by the automatic alteration of the control point.

An example of the use of this " Time Schedule Controller " is in the drying of certain leathers and fur skins in which it is necessary slowly to alter the conditions of temperature and humidity in the drying chamber throughout the process in order to maintain the supple texture of the hides and skins and also to avoid " shrinkage " as much as possible.

Three Classes of Automatic Control

Automatic controls can be divided into three classes—viz., those operated by :

(*a*) Compressed Air.
(*b*) Water.
(*c*) Electricity.

Again, these can be further classified into types—viz. :

(*a*) The bi-metallic—*i.e.*, utilising the difference in ratio of expansion of two dissimilar metals to operate either a small " pilot " valve on compressed air or water or electric contacts.

(*b*) The " vapour tension " type, which consists of a bulb or phial filled with a volatile fluid, the temperature around which causes pressure changes to be transmitted via a capillary and tube to either a spring or bellows in the controlling instrument and operates a " pilot " valve or switch.

(*c*) A mercury-actuated type which functions similarly to that described in (*b*) but in this case the change in pressure is due to the expansion or contraction of the mercury.

The Differential Controller

There is also a type of controller which can be termed Differential Controller. This enables the conditions under control to maintain a constant difference between outside climatic conditions and those in the room or building. This controller has two bulbs and capillary tube systems, the bulb in the room being termed the " control " bulb, whilst the other, in the outside air, is termed the " resetting " bulb. The operation of this system is that any changes in the outside conditions affect the " resetting " bulb, causing the Bourdon spring, to which it is connected by its capillary tube, to reset the control point to give the required differential temperature. The " control " system then takes care of the automatic operation of the air-conditioning plant until the required conditions are obtained. This is known as the " direct ratio " method.

Inverse Ratio

Another method termed " inverse ratio " is utilised when, for example, increasing of temperature conditions in a room, due to the influx of a large number of people, requires cooler air-conditions to be delivered to the room. In this case the bulb in the room becomes the " controller " bulb, whilst the other bulb usually placed in the " washer " becomes the " resetting " bulb.

This system of automatic control has been in use in the banqueting and dance hall of a large well-known London hotel. In this case the latent and sensible heat load caused by the number of people dining or dancing at any one time is automatically compensated by the alteration of the " dew point " in the " washer " to give cooler conditions of the treated air delivered and thus maintaining a constant dry bulb temperature in the hall. There have been as many as 2,000 people in the hall at one time, yet the temperature conditions throughout the session of dining and dancing have remained constant.

NATIONAL WHEATMEAL AND BREAD

Incorporating the results of latest research and defining more exactly the character of the particular 85 per cent. extraction flour recommended by the Accessory Food Factors Committee of the Lister Institute and the Medical Research Council.

THE following is the text of the Medical Research Council's second memorandum on the subject, as published by the *British Medical Journal*:

The Accessory Food Factors Committee of the Lister Institute and the Medical Research Council, in a memorandum issued in the summer of 1940, recommended the adoption for bread of a flour of 80 to 85 per cent. extraction of the wheat, in the following terms:

> "Flour for the bread of the people should contain the germ of the wheat grain, as much as possible of the aleuron layer, and the finer portions of the bran. Instead of flour consisting of about 70 per cent. of the wheat grain, as it does at present, the percentage extracted should be at last 80 to 85 per cent."

Since this recommendation was made the Ministry of Food has decided to make generally available to the public bread baked from flour of 85 per cent. extraction. In the original memorandum the nutritional considerations on which the recommendation was based were set out. It now seems desirable to restate them, incorporating the results of further research and defining more exactly the character of the particular 85 per cent. extraction flour recommended by the committee.

Special Nutritive Properties of the Flour Selected

The degree of extraction was fixed at 85 per cent. in order to secure a flour which should contain (*a*) as much as possible of the B vitamins, including riboflavin and nicotinic acid and especially of vitamin B_1, present in the whole wheat; (*b*) as much protein as possible, including a high proportion of that situated in the outer layers of the grain. This protein is known to possess a higher nutritive value than that contained in white flour; (*c*) as little bran as possible, so that there should be no risk of loss of nutritive value due to presence of much indigestible material. War-time diets already contain much vegetable food, with relatively large amounts of roughage; it is undesirable to increase this further.

Production of Flour of 85 Per Cent. Extraction

Flour of 85 per cent. extraction can, in practice, be obtained by two general methods: (i) by arrangement of the milling machinery to produce a flour containing 85 per cent. of the wheat, or (ii) by addition to the white flour (73 per cent. extraction), obtained in the ordinary milling processes, of combinations of the other fractions of the wheat.

The consideration which has influenced the final choice of the flour to be adopted has been the need to combine two qualities: first, the best nutritive value; and, secondly, the production of a loaf as little removed as possible in colour, texture, and flavour from that of ordinary white bread. Two flours, prepared respectively by the above methods (i) and (ii), were chosen as possessing equal nutritive value, the first, however, being preferable as fulfilling the second condition most perfectly. Flour (i) was selected as the best for the following reasons:

(*a*) Of all flours obtained at the same level of extraction by different methods from the same grist, it had the highest vitamin B_1 content, and in this respect closely approached that usually accepted for wholemeal bread.

(*b*) It had the lowest fibre content compared with other flours extracted at this level from the same grist.

(*c*) Of all the breads tested, baked from 85 per cent. flour, it yielded the one which resembled white bread most closely in flavour and texture.

(*d*) The colour of the bread was pale brown and was not unattractive.

(*e*) On technical and on æsthetic grounds the loaf baked from it was considered excellent.

Definitions Proposed for the Selected Flours

FLOUR (i).—This straight-run flour may be defined as a flour containing 85 per cent. by weight of the clean wheat, in which is included (*a*) the maximum amount of the germ and of the aleuron layer, and (*b*) the minimum of the pericarp, as shown by its low fibre content.

FLOUR (ii).—May be defined as (*a*) containing 85 per cent. of the weight of the clean wheat grain, in which is included all the white flour, all the reduction roll tails, mill finish and purifier tails, and sufficient fine bran to bring the amount of the mixture up to 85 per cent. of the clean wheat; (*b*) containing 85 per cent. of the clean wheat and excluding 15 per cent. consisting of the bran and pollards.

Analyses of samples of flour (i) and (ii) are set out in the table below, with those of white flour of 73 per cent. extraction and of wholemeal flour, all four materials being derived from the same grist (water content being 15 per cent.):

Flour.	*Fibre* %	*Ash* %	*Protein* %	*Vitamin B_1 I.U. per gm. (Thiochrome Method.)*	*Calcium mg./100 gm.*	*Phosphorus mg./100 gm.*	
						Total.	*As Phytic Acid.*
i (85%) ..	0·60	0·90	11·4	1·2	27	203	123
ii (85%) ..	0·85	0·94	11·5	1·15	27	211	128
White (73%)	0 to 0·20	0·46	10·6	0·35	15	101	35
Wholemeal (100%) ..	1·8	1·51	11·9	1·4	36	343	246

Samples of flours (i) and (ii), obtained from the same grist, were found to be similar in content of protein, ash, and vitamin B_1, which in both cases was over 1 I.U. per gramme (thiochrome method). The fibre content of both flours was less than 0·9 per cent., that of flour (i) being lower than that of flour (ii) by about 20 per cent. The lower the fibre content the better is the flour and the more efficient is the milling.

KEEPING PROPERTIES.—No exact evidence is as yet available regarding the keeping properties of the particular types of flour selected, but from the experience gained of other brown and wholemeal flours there is little doubt that this flour of 85 per cent. extraction could be kept in good state under reasonable conditions of storage for four to six weeks or longer.

RECOMMENDATION I.—The Accessory Food Factors Committee at its meeting on January 23, 1941, recommended that a flour of 85 per cent. extraction, similar to flour (i), should be adopted. Since modification of ordinary milling machinery would be required for production of flour (i), and this would take time, it was further recommended that a flour of 85 per cent. extraction, similar to flour (ii), should be adopted in the meantime, as this could be produced without any delay. The flour should not contain less than 1 I.U. of vitamin B_1 per gramme, and the fibre should be less than 0·9 per cent. (assuming a water content of 15 per cent.).

Addition of Salts to Flour

CALCIUM SALTS.—It is known that the intake of calcium salts in the diets of this country, especially among the poorer classes, is often below the minimum accepted by nutrition experts as necessary for satisfactory growth of bones and teeth in growing children and for maintenance of the bones in adults. The addition of calcium salts to bread was recommended in the previous memorandum issued by the Medical Research Council. It is now possible to add details concerning the amounts required. Wholemeal bread and bread made from flour of 85 per cent. extraction contain more calcium than white bread and also more phosphorus. A large proportion of the phosphorus, however, is present in a combination (phytic acid) in which it is not directly available to the organism and at the same time diminishes the availability of the calcium present in the bread and in the rest of the diet. Recent tests made on human subjects for the Medical Research Council have shown that to maintain a sufficient supply of calcium salts for health more calcium salts must be added to the diet. The most convenient way to do this is to add calcium carbonate to the wheat flour used for bread. As a result of the above test on human subjects it has been calculated that additions are needed at 65 mg. of calcium per 100 grammes of white flour (7 oz. of $CaCO_3$ as creta præparata B.P. per 280 lb. sack) and of 130 mg. of calcium per 100 grammes of flour of 85 per cent. extraction (14 oz. of $CaCO_3$ per sack). In the case of the 85 per cent. extraction flour the extra 7 oz. per sack is required to neutralise the effect of the phytic acid

contained in flour of this degree of extraction. It has long been a practice in baking to add similar amounts of substances known as "improvers" (*e.g.*, acid calcium phosphate 12 oz. per sack, or up to 4½ lb. per sack in case of certain self-raising flours at present on the market). The addition of the recommended amounts of calcium carbonate to flour has no effect on the vitamin B_1 content of the flour or on its baking properties.

RECOMMENDATION II.—It is recommended that calcium carbonate (as creta præparata B.P.) should be added to the wheat flour from which white bread is made in the proportions of 7 oz. per sack (280 lb.) of white flour and of 14 oz. per sack of 85 per cent. extraction flour.

IRON SALTS.—The desirability of adding iron in some form to flour has been considered, the reason being that anæmia due to insufficient iron in the diet is common in this country and could easily and cheaply be prevented by the administration of simple ferrous salts. A study of the available data on this subject has, however, led to the conclusion that the presence of added iron salts in flour might cause destruction of some of the other nutrients present. It is therefore not recommended that any such additions be made until further knowledge on this point is available.

"IMPROVERS."—The addition of certain "improvers" to bread baked from flour of high extraction facilitates the work of the baker and results in a more attractive loaf. Such evidence as is available does not justify at this stage the prohibition of their use in the baking industry, and the question has therefore been left open.

MINISTRY OF FOOD

LATEST STATUTORY RULES AND ORDERS

The list given below is the continuation of the list of Orders published in *Food Manufacture*, August 1, page 184.

No.	*Date.* 1941.	PRICE FIXATION ORDERS
924	June 27.	The Fish (Maximum Prices) Order, 1941. (2d.)
927	,, 28.	The Eggs (Control and Prices) (Northern Ireland) (N. 2) Order, 1941. (2d.)
945	July 2.	The Soft Cheese and Curd Cheese (Maximum Retail Prices) Order, 1941.
956	,, 3.	The Imported Canned Meat (Maximum Prices) Order, 1941, prescribes a Schedule of maximum importers', wholesale and retail prices for several varieties of imported canned meat. The varieties specified are: Corned beef, corned or boiled mutton, ox tongues, briskets, lamb's tongues (12-oz. tins); Australian minced meat loaf (12-oz. tins), Australian or New Zealand Canned Rabbit (2-lb. and 1-lb. tins), Eire stewed steak (16-oz. tins), and Eire ready or prepared meals (16-oz. tins). (1d.)
962	,, 4.	General Licence under the New Potatoes (Maximum Prices) Order, 1941.
970	,, 7.	Amending the Jam (Maximum Prices) Order, 1941. (2.)
974	,, 8.	General Licence under the Eggs (Control and Prices) Order, 1941, and the Eggs (Control and Prices) (Northern Ireland) Order, 1941. (1d.)
981	,, 9.	Amending the Milk Powder (Prescribed Prices) Order, 1941. (1d.)
982	,, 9.	The Oranges (Maximum Prices) Order, 1941. (2d.)
983	,, 9.	Amending the Tapioca and Sago (Maximum Prices) Order, 1941. (1d.)
1031	,, 17.	The Green Onions (Maximum Prices) Order, 1941. (1d.)
1041	,, 18.	Amending the New Potatoes (Maximum Prices) Order, 1941. (1d.)
1049	,, 19.	The Eggs (Control and Prices) (No. 2) Order, 1941. (3d.)
1050	,, 19.	Amending the Food (Current Prices) Order, 1941. (1d.)
1078	,, 24.	Amending the Food (Current Prices) Order, 1941. (1d.)
1081	,, 24.	The Threshed Home-Grown Peas (Control and Maximum Prices) Order, 1941. (2d.)
1085	,, 24.	Amending the Imported Canned Meat (Maximum Prices) Order, 1941. (1d.)
1106	,, 26.	Amending the Lard (Maximum Prices) Order, 1940. (1d.)
1114	,, 26.	Amending the Eggs (Control and Prices) (No. 2) Order, 1941. (1d.)
		MILK AND MILK PRODUCTS
928	June 28.	Amending Directions under the Rationing Order, 1939, and amending the Cheese (Rationing) Order, 1941. (1d.)
946	July 2.	General Licence under the Use of Milk (Restriction) Order, 1941.
		CANNED MEATS
955	July 3.	Amending the Imported Canned Meat (Requisition) Order, 1939.
		FISH
975	July 8.	The Canned Fish (Control) Order, 1941. (1d.)
		CEREALS
980	July 9.	The Bread (Licensing of Producers) Order, 1941. (1d.)
		FEEDING STUFFS
990	July 10.	Directions under the Feeding Stuffs (Rationing) Order, 1941. (1d.)
994	,, 11.	Amending the Compound and Mixed Feeding Stuffs (Control) (No. 2) Order, 1940. (2d.)
		FLOUR AND CONFECTIONERY
961	July 3.	The Biscuits (Licensing and Control) Order, 1941, prohibits the manufacture of biscuits by way of trade, except under licence of the Minister. This restriction does not apply to the manufacture of a total quantity of 12 tons or less, during the 12 months from the date on which the Order comes into force or during any succeeding 12-month period, by any manufacturer whose total production of biscuits in 1940 did not exceed 12 tons. (1d.)
		GENERAL
832	June 12.	Directions under the Sale of Food (Public Air Raid Shelters) Order, 1940. (1d.)
833	,, 12.	Directions which suspend the operation of the Merchandise Marks (Imported Goods) No. 3 Order, 1934, of Sections 2 and 5 of the Merchandise Marks Act, 1926, and of any Orders in Council made under the Act, in so far as they relate to the indication of a mark of origin on imported bacon and ham. (1d.)
916 925 930	,, 25 ,, 27 ,, 30	Directions under the Sale of Food (Public Air Raid Shelters) Order, 1940. (1d.)
964	July 5.	Amending the Rationing Order, 1939, and the Directions dated January 6, 1940, made thereunder and giving further Directions thereunder and amending the Tea (Rationing) Order, 1940, the Cheese (Rationing) Order, 1941, and the Preserves (Rationing) Order, 1941. (2d.)
1009	,, 14.	Directions under the Sale of Food (Public Air Raid Shelters) Order, 1940. (1d.)
1022	,, 15.	The Tea (Licensing and Control) Order, 1941. (1d.)

NEWS FROM THE INDUSTRY

MINISTRY OF FOOD

Change of Address of Ministry Headquarters

The address of the London Headquarters' Office of the Ministry of Food is now Portman Court, Portman Square, London, W. 1. (Telephone Welbeck 5500).

* * *

Licensing of Bacon Curers and Butchers' to Produce Lard

The Ministry of Food announced the making of an Order prohibiting, from September 22, 1941, the production, refining or sale by wholesale of lard and hog grease, except under licence.

The Minister of Food has now issued two General Licences permitting bacon curers holding licences under the Bacon (Licensing of Producers) Order, 1939, and butchers holding licences under the Food Control Committees (Local Distribution) Order, 1939, to produce lard without the necessity for holding individual licences.

* * *

Control of Pickles and Sauces

The Minister of Food ordered that from September 8 the manufacture of more than 3 tons per annum of pickles and sauces may be carried out only under licence. Applications for licences should be made to the Ministry of Food, St. John's College, Oxford. The schedule to the Order sets out a list of maximum prices for twenty types of pickles, sauces and relishes to come into force on October 1. Pickles, sauces and relishes may be sold at higher prices in cases where a manufacturer has special authorisation.

* * *

Prices of Oils and Fats

The Ministry of Food announces that there will be no change in the existing price of oils and fats allocated to primary wholesalers and large trade users for the four weeks ending September 27.

* * *

Control of Pepper Prices

Pepper prices are to be controlled. The Ministry of Food fixed maximum prices which operated from September 1 for processors and wholesalers, from October 1 for retailers and manufacturers, and from November 1 for the public and for small manufacturers who purchase less than 28 lbs. at a time.

Maximum retail prices will be, per pound: Whole white, 2s.; whole black, 1s. 8d.; ground white, 2s. 8d.; ground black, 1s. 4d.

* * *

Mr. E. Twentyman

Mr. E. Twentyman, Second Secretary to the Ministry of Food, has arrived in Washington to take up his position as senior member of the British Food Mission, under Mr. R. H. Brand, head of the mission.

Bread Making, Wrapping and Slicing

The Ministry of Food announced that wrapping and slicing bread will be prohibited, and the use of oils and fats in bread making restricted, by an Order which took effect on September 29.

* * *

Maximum Prices for Fruit Pulp

The Fruit Pulp (Control and Maximum Prices) Order, 1941, has been amended by:

(*a*) Including Blackberry pulp, the maximum price for which has been fixed at £38 13s. 4d. per ton.

(*b*) Deleting "Plum (cooked)" and adding "Yellow or Green Plum (cooked)" and "Red Plum (cooked)", for which maximum prices have been fixed at £38 and £44 6s. 8d. respectively.

(*c*) Increasing the maximum prices for Apple pulp and Damson pulp to £23 3s. 4d. and £53 13s. 4d. per ton respectively.

The Amending Order also requires that accurate records shall be kept of purchases and sales of fruit pulp.

* * *

Food Supplies under the Lease-Lend Act

In connection with the White Paper on Export Policy and Lease-Lend Distribution of recent date, the Ministry of Food points out that the supplies of food likely to come from the United States under the Lease-Lend Act will constitute only some 5 or 6 per cent. of the United Kingdom's total consumption of food, home grown and imported; but their value is considerably greater than would appear from these figures. They include concentrated proteins such as cheese, canned milk, dried milk, eggs, canned fish and canned meat. In the case of some of these—*e.g.*, canned milk—the supplies from the United States represent a very considerable proportion of our total supply.

The supplies under the Lease-Lend Act are restoring the balance in the British diet; making it more varied; improving both well-being and morale and so sustaining the war effort.

War-time Food History

Cheese and eggs being raised from the hold of the first American ship to reach this country with a cargo of food despatched under the terms of the Lease and Lend Act. Lord Woolton, the Minister of Food, is in the centre of the group beside the hatch, with Mr. A. Harriman of the U.S.A. on his right.

(*Courtesy of The P.L.A. Monthly.*)

A Portable Hay Box

For the benefit of workers in factories, offices and on the land, who stated that they would like to take with them a cooked meal for midday but often have no facilities for heating it, the Ministry of Food has produced a portable hay box, which is simple to make and convenient to carry.

The Ministry recently demonstrated several simple types, and at 1 p.m. meals which had been packed at 7.30 a.m. were appetisingly hot. A suitable box, lined with newspaper and brown paper to make it airtight and perhaps covered with some more attractive material, a screw-top glass jar and small cushions containing dried lawn mowings, are all that is required. Certain types of gas-mask container make convenient carriers, and nothing larger is necessary.

These carriers should prove popular in the winter; meanwhile, if used for carrying a salad meal they keep lettuce and other vegetables attractively crisp.

* * *

British Melters and Food Ministry

The Ministry of Food is to be represented on the Board of British Melters, which was registered on August 20 as a private company with a capital of £2,000 in £1 shares. The company is to act as buying, selling and commission agents, and make arrangements as to the manufacture and distribution of edible fats.

The Board is to consist of one or more persons (if any) as may be nominated by the Minister of Food, Sir Francis Boys, who has a long and wide experience of farming and of dealing with meat supplies, and members of the present council of the Raw Fat Melters' Association of Great Britain. The secretary is Mr. William Woods, 66, Mosley Street, Manchester.

* * *

Canteen Catering

A booklet entitled *Canteen Catering* has just been issued by the Ministry of Food for British Restaurants, industrial canteens and other large-scale feeding centres.

This booklet has been compiled as a result of a nine-months' investigation and experiment in industrial canteens in all parts of England, Scotland, Wales and Ireland, and all recipes have been tested in such canteens.

Each day's suggested meal has been built up on the principle of the Oslo breakfast, to provide in one meal a high proportion of the day's requirements of essential vitamins and mineral salts. Averaged over six consecutive days the analysis is as high as that of the Oslo breakfast.

The aim throughout has been two-fold—firstly, to show how it is possible to provide attractive and palatable meals of a high nutritional standard under the present difficulties of rationing and supplies; secondly, to take the present opportunity of food consciousness to change gradually the food habits of the majority of working people in this country so that the standard of the national diet is improved rather than allowed to deteriorate. For this purpose, it will be observed that all bread is given as National Wheatmeal, a raw vegetable is included in every meal in some form or other, cooked vegetables are suggested in much larger quantities than is usual in canteens, and oatmeal or wheatmeal flour is used freely in cooking.

This booklet is being issued free to all British Restaurants, industrial canteens and Londoners' meal services. Copies can be obtained from the Nutrition Section, Food Advice Division, of the Ministry of Food.

* * *

Canadian Coconut Oil

Brought into steady operation last June, the plant of W. R. Carpenter (Canada), Ltd., Vancouver, B.C., which is now producing at the rate of 30 short tons of crude coconut oil daily, is being enlarged threefold with a view to putting it in a position to supply the entire Canadian market.

Completed at a cost of approximately $300,000, the plant is to be increased at once at a further cost of about $150,000, according to an announcement made by E. E. Buckerfield, director. Storage capacity will be increased from 4,000 to 10,000 tons, and the number of oil expellers will be increased from two to six. This will increase the output of hydrogenated coconut oil from about 30 tons to 90 tons daily. The additional equipment is expected to be ready for operation by October 1.

* * *

Community Frozen-Food Lockers

Slow to accept ideas originating in the west, New York City at last has embraced the community frozen-food locker, states *Advertising and Selling* (U.S.A.). First plant, opened June 14, has 480 lockers, each with a capacity of 250 to 300 lbs. of perishable food products, such as meat, poultry, fruits and vegetables. A family may rent such a "safety deposit box" and store in it, at zero temperature, products they have grown or bought in large quantities at a saving. Housewives may deposit or withdraw daily supplies. More than 3,000 such storage plants are now in operation, some with 1,500 lockers.

Imports from Eire

The Board of Trade announce that the following additions have been made to the classes of goods requiring separate licences when imported from Eire with effect from September 23: Onions, including shallots; all fresh and preserved fruit not already subject to separate licences.

Applications for licences (in duplicate) should be made to the Ministry of Food, St. John's College, Oxford. Forms of application may be obtained from the Import Licensing Department or from the offices of Collectors of Customs and Excise. The direction at the head of the application form that it should be forwarded to the Import Licensing Department should be ignored.

* * *

Lieut.-Colonel Harding was elected last June Chairman of the Council of the London Chamber of Commerce. Eminent in the food industry, Colonel Harding is Chairman of Messrs. Maconochie Bros., Ltd. He is also President of the Food Manufacturers' Association, to which he has been re-elected every year for the last five years.

* * *

Food from Turkey

As a result of negotiations concluded in Ankara, Great Britain is to place orders with Turkey totalling £4,500,000, mainly for dried fruits, preserved foods and fish, according to the Vichy News Agency, quoted by Reuter.

In exchange, Turkey will receive from Great Britain hides, pneumatic tyres, tin, trucks, motor-cars and railway materials.

* * *

New Zealand Meat for Britain

The New Zealand Minister for Marketing, Mr. Barclay, has announced to the meat producers' conference that his information indicated that the United Kingdom Government would endeavour to take 275,000 tons of meat during the coming season and that the New Zealand industry was expected to make every effort to ensure that its exportable surplus did not exceed that quantity. The meat in store at the end of the current season, he added, was expected not to exceed 85,000 tons, which was much better than had been anticipated.

Canadian Concentrated Milk

Canada produced 28,164,864 lbs. of concentrated whole milk and by-products during May, an increase of 27 per cent. or 6,057,686 lbs. over the previous month, Dominion Bureau of Statistics reports. The latest figure was 33 per cent. or 6,975,144 lbs. higher than in May, 1940.

In the five months ending May 31, concentrated milk production amounted to 90,791,120 lbs., compared with 69,711,948 lbs. in the same period last year.

Exports of concentrated milk rose to 5,689,000 lbs. from 1,518,300 lbs. in May, 1940. Stocks of evaporated milk at June 1 were estimated at 20,763,290 lbs., against May 1's revised total of 13,188,300 lbs.

* * *

Autumn Wild Fruit Crop

The Board of Education, in a memorandum to schools, urges the need for making the best possible use of the autumn wild fruit crop—blackberries, bilberries, crab apples, elderberries, rowan berries, and sloes. Fruit collected by schools can, if not used for immediate consumption, be sold to fruit preservation centres or made into jam by the schools for their own consumption; additional supplies of sugar will be available to schools for this purpose from local food offices.

* * *

War Damage Act, 1941 (Part II)

The Board of Trade have made an Order amending the War Damage (Business Scheme) Order, 1941, to permit insurance of the following goods under the Business Scheme on a voluntary basis:

- Gold bullion.
- Stamps for postage and for payment of any tax, duty or contribution.
- Hoardings not exceeding 70 square feet in area for the exhibition of posters.
- Goods used in the course of mining operations when the goods are below ground.
- Containers for the supply of goods, being containers of a value not exceeding £5 each which are owned by the supplier but are not in his possession.
- Books owned in the course of a business of letting out books on hire while they are in the possession of any person other than their owner or his agent.

The new Order also provides for voluntary insurance of goods owned by Territorial Army Associations and Territorial Army and Air Force Associations.

* * *

Income Tax Poster and Leaflet

A poster and the leaflet giving salient facts about income tax have been printed by the Ministry of Information for the Industrial Publicity Committee—an inter-departmental committee representing Government Departments concerned with war supplies and wartime industrial production.

Copies of the poster and leaflet would be sent—without charge—direct to works.

Mr. Ford's Gift of Food-carrying Vans to Britain

Lord Perry has announced in London that Mr. Henry Ford and his son, Mr. Edsel Ford, have given equipment to a retail value of approximately £150,000 to provide a new fleet of emergency food-carrying units for Britain.

There will be units of two or more specially designed and equipped vans for towns in and surrounding all vulnerable areas. The fleet will operate in conjunction with "blitz" feeding arrangements already made by the Ministry of Food and local authorities, and will rush soup or hot meals to the points where the need is urgent.

Announcing the gift, Lord Perry, who is Chairman of Ford Motor Company, Ltd., said that not only have the vans been provided free, but they will also be maintained without cost to the community through the generosity of Ford dealers, who have undertaken to house and maintain them ready for immediate use, day or night, at their own expense.

The Ministry of Food and local authorities everywhere have welcomed this new plan, which augments communal feeding centres and other emergency arrangements.

The vehicles are to be at the call of the authority responsible for providing food, and will carry it, cooked and ready to serve, to the points where it is required.

Food will be served "at the door", or rather in the street, to those who are without the means of cooking and out of easy reach of a feeding centre. The mobility of the arrangements will make it possible for hot meals to be provided for those temporarily housed in church halls, schools or empty houses, or perhaps workers whose canteens have been put out of action. The vans may also be used to serve hot meals by the roadside when people seek respite from concentrated raids by taking to the country.

A special feature is that the vans are provided with insulated containers developed by Ford for the purpose. These are capable of keeping food hot for several hours.

One van will carry five of these insulated containers, sufficient to provide hot soup for 800 persons or a lesser number of meals consisting of meat, vegetables and a sweet.

The vehicles will be staffed by the members of the Women's Voluntary Services, and will be controlled by the Ford Emergency Food Vans Trust, 88, Regent Street, London.

Already a number of industrial undertakings, societies and private individuals have followed Mr. Ford's magnificent lead by providing funds for the provision of additional vehicles and extra vans will be added to the fleet.

* * *

Mr. W. J. Parslow

We wish to offer our congratulations to Mr. W. J. Parslow, Director and General Manager of Messrs. Tecalemit, Limited, the lubrication specialists, on his appointment to the position of Joint Managing Director with Mr. R. A. Chalmers.

[F]

OBITUARY

Sir Isidore Salmon

We regret to record the death of Sir Isidore Salmon, Chairman of Lyons, who died on September 16, at the age of 65.

During the present war he was Honorary Adviser on catering to the British Army, and his work in reforming Army feeding is well known.

Sir Isidore was a man of many parts. He became a member of the L.C.C. in 1907, and Vice-Chairman in 1924, in which year he was elected M.P. for Harrow and held the seat at the time of his death. He was Chairman of a large number of Parliamentary Committees and received his knighthood in 1933.

* * *

Changes of Address

The London Office of the Brush Electrical Engineering Co., Ltd., and of Brush Coachwork, Ltd., has been moved from 88, Kingsway, and the new address is Bush House, North-West Wing, Aldwych, London, W.C. 2. Telephone number is Temple Bar 6262 (3 lines).

* * *

The London Office of Petters, Ltd., has been re-opened at Bush House, North-West Wing, Aldwych, London, W.C. 2. Telephone number is Temple Bar 6262 (3 lines).

Mr. A. P. Quarrell, A.M.I.Mech.E., is resuming his duties as London Manager.

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The new address of the California Fruit Growers Exchange, Ltd., is 11, Bruton Street, London, W. 1. Telephone: Mayfair 3367 (2 lines). Telegrams: "Sunkistex", Westdo, London.

* * *

Mr. Richard Gordon Thyne

Mr. Richard Gordon Thyne, of Dunottar, Colinton, Edinburgh, for many years chairman and director of Messrs. A. and R. Scott, Ltd., millers, left personal estate £73,424.

California Fruit Growers Exchange, Ltd.

The California Fruit Growers Exchange, Ltd., have issued the following letter to their customers:

"DEAR SIRS,—We have to inform you that this company has had to cease supplying its customers in the United Kingdom with citrus juices and pectin for the duration of the war. The Ministry of Food has notified us that no further licences to import these commodities from the U.S.A. can be granted. All additional supplies will be imported by the Government under the terms of the Lease-Lend Act, and your future enquiries should therefore be addressed not to us but to The Director of Fruit Juices and Pectin, Ministry of Food, Portman Court, Portman Square, London, W. 1.

We wish to thank our many customers for the business and consideration they have given us since the formation of this company in 1923. This enforced temporary break in our relations with them is very distressing to us—and we hope also to them. We look forward to a resumption of trading and a renewal of old friendships after the war.

(*Signed*) G. T. SHIPSTON,
Managing Director."

* * *

Mr. G. T. Shipston, B.Sc., F.I.C.

Mr. G. T. Shipston, B.Sc., F.I.C., has been appointed Director of Fruit Juices and Pectin in the Ministry of Food.

NOTE.—Mr. Shipston is the managing director of the California Fruit Growers Exchange, Ltd., London, whose letter to their customers we publish above.

* * *

Memorial to Lord Austin

Lord Nuffield last month inaugurated with a personal contribution of £1,000 a fund for a memorial to the late Lord Austin. A similar sum was immediately promised by the Austin Motor Co., Ltd.

Lord Nuffield feels that in view of Lord Austin's outstanding services to the cause of motoring and his brilliant achievements as an engineer, it would be a grave omission if a prominent and lasting memorial were not brought into being.

While the ultimate form must depend to some extent on the amount subscribed, it is hoped that the bulk of the money will be allocated to an Endowment Fund to be administered by the Motor and Cycle Trades Benevolent Fund.

Lord Nuffield believes that not only those in the motor trade and associated industries will wish to contribute to the fund, but also the many who were introduced to motoring for the first time by the "Baby Austin"—possibly Lord Austin's greatest and most personal achievement.

Contributions, which will be gratefully acknowledged, should be addressed personally to The Viscount Nuffield, Oxford.

* * *

Mr. Duncan M'Grouther

Mr. Duncan M'Grouther, bacon curer, late of Cornton Road, Stirling (gross movable estate £7,735), left net movable estate of £7,206.

Fibre Substitute for Baling

A fibre substitute for baling wire called "Balax" is being used by a great many industrial firms for baling their waste paper.

The use of this fibre substitute for baling wire effects a saving of something over 20 per cent. in baling costs owing to the fact that there is three times more yardage in a ton of the material than there is in a ton of baling wire.

The material was invented by British Ropes, Ltd., themselves large manufacturers of baling wire, in order to conserve supplies of steel. Its production is now subject to the Hemp Control Section of the Ministry of Supply. It is necessary to obtain a licence to spin the amount of any order but, generally speaking, the Hemp Control are willing to authorise the spinning of three months' supply for any user whose stock is small, provided that the necessary form is sent with the order.

Food manufacturers will doubtless be interested to know about this war-time substitute for baling wire that unquestionably effects very real economies in baling cost and in the use of steel.

* * *

Food Decontamination

Sir Ernest Gowers, London Regional Commissioner, recently saw Britain's first "food laundry"—a building for the decontamination of food which has been affected by gas. He congratulated the organisers, who are volunteers drawn from food traders in Hornsey. Meat, sugar, rice, haricot beans, potatoes, eggs, split peas and a variety of tinned and bottled goods which were assumed to have been in a grocery store and butchery affected by mustard gas were "decontaminated".

It was pointed out that sealed tins and drums, and glass bottles with well-fitting stoppers give complete protection from gas, and even waxed cartons, cellulose wrappings, and grease-proof paper afford some protection. In the case of non-persistent gases a 48-hours' airing is often enough to make the food perfectly safe.

* * *

Protection against Dermatitis

Factories in which toilet preparations are used for protection of workers against dermatitis have been limited in the quantities they can get by the Limitation of Supplies, No. 11 Order. If they are unable to get enough for their needs, and provided that one of H.M. Inspectors of Factories certifies that there is a risk of dermatitis in the nature of the factory work, the Board of Trade will issue a special licence to the supplier of the preparation. This will permit quantities to be obtained by the factory beyond the supplier's quota.

* * *

The Confectioners' Benevolent Fund

It is particularly requested that suitable cases deserving assistance be brought forward by donors and subscribers to the notice of the Executive Committee, for their consideration.

A new portrait of Mrs. E. H. Gasking, who is Chairman and Joint Managing Director of Batchelor's Peas Limited.

Batchelor's Peas

Progressively successful in the important occupation of food canners and packers, the business of Batchelor's Peas distributed record quantities of goods during the past financial year. The additional profits earned—they are absorbed by larger taxation—were due entirely to the increase in production. At the fifth ordinary general meeting the Chairman, Mrs. E. H. Gasking, emphasised that the company had maintained exceptionally low prices in pursuance of previously declared policy. Fair and reasonable treatment of all customers is another aim of the Board, and this will be continued.

Since formation the company has steadily widened the range of products. Agricultural connections have been so developed that the company is able to can a far greater variety of fruit, vegetables, soups and the like than ever before. Some foods are being produced for which formerly foreign countries were relied upon. The value of Batchelor's products, commanding a wide and ready sale in peace-time, will be enhanced in the coming winter season.

* * *

Synthetic Sausage Casings

As the imports of sausage casings are now stopped, Brainos and Co. are in a position to be of assistance to manufacturers in difficulties.

They are manufacturers of the new casing "Vita-Natcherik", made from animal substances with a skeleton of special fibres, the combination of which reproduces the structure and chemical composition of the animal gut in the closest possible way.

* * *

Change of Name

Elder Dempster (Grand Canary), shipping agents, fruit growers, etc., 101, Cannon Street, E.C., has changed its name to Elder Dempster (Canary Islands).

British Central Africa Company

At the seventeenth annual general meeting of the British Central Africa Company, the Chairman, the Right Hon. Sir Montague Barlow, Bart., P.C., K.B.E., in the course of his speech said with regard to soya beans that in spite of certain climatic difficulties the results in the year under review have shown a considerable improvement in output. In the year ended September 30, 1940, the yield per acre, which in 1938-39 was only 422 lbs., was 829 lbs., or nearly double the previous year. In addition, the price realised showed a very substantial increase.

Soya bean has a variety of uses in the world to-day, its two principal uses being to crush for oil, the by-product being valuable as cattle food; or in various forms for human consumption. In war-time, naturally, the use for human consumption is of greater importance, and it is satisfactory that, with a view to human consumption, soya has now been placed by the Government on the priority list for purposes of transport, etc.

* * *

War Gases and Crops

Wholesale damage to crops by poison gas is improbable, but incidental contamination, especially near towns, may occur, and farmers should be prepared to deal with affected crops in the fields and in store.

"Growmore" Leaflet No. 38 gives some useful advice on the subject, and may be obtained free on application to the Ministry of Agriculture at Hotel Lindum, St. Anne's-on-Sea, Lancashire.

* * *

Essential Oils

The supplies of nearly all essential oils widely used by food and confectionery manufacturers are becoming more and more difficult with market prices changing daily, and almost invariably in an upward direction. Stafford Allen and Sons, Ltd., in their Market Report for September, 1941, strongly recommend their friends to endeavour to maintain a good stock of these key flavours and oils so essential to the maintenance of the high standard of their products.

Among other things, the report states that stocks of Chinese and Japanese peppermint oils are extremely scarce, but supplies of American oils have been coming through in those cases where importers have not used up their quota before now. Prices have advanced considerably.

Supplies of lemon oil from California, which is the only source from which there are any substantial quantities now being shipped, have been coming through fairly well, but stocks are very small and inadequate to meet the general demand.

There is no orange oil coming from Africa, and it is to-day practically unobtainable, as is tangerine oil, but there is a tangerine oil substitute which can be offered in small quantities.

Powdered gums are scarce, and prices have risen considerably during the last three months.

INFORMATION AND ADVICE

Canning of Sausages—Preserving of Meat and Fish Pastes—Sausages and Cooked Meats—Information Supplied

Canning of Sausages

7,245. *Could you give us information on the canning of sausages? Do you know of a suitable substitute for lard or dripping, both of which are difficult to obtain for this purpose now?* (London.)

The nature of a reply to your enquiry depends, of course, on whether you have previous knowledge of canning in a general way. If you have not, it would be necessary to consult an expert; but, if you have, the following suggestions may be useful:

Soak the sausages first in cold water for one hour and then heat slowly so as to swell them progressively. Leave one to two hours in the slowly boiling water and place into cans. Cover with melted lard and seal and process. Approximate time for processing is: 2-lb. can, one hour thirty minutes at 228° F.

It is not satisfactory to pack sausages alone, but you might fill up the inevitable space after the sausages have been packed with a 10 per cent. solution of gelatine.

Preserving of Meat and Fish Pastes

7,241. *Will you please send me information regarding the preserving of meat and fish pastes in glass containers, equipment required and full information regarding process?* (Sheffield.)

You should refer to the following issues of FOOD MANUFACTURE:

1939—Page 230.	1932—Pages 179, 210.
1938—Pages 34, 107.	1935—Page 144.
1937—Page 320.	1936—Page 151.

As a subscriber, you will probably have the copies mentioned above. Many of them are now out of print, but, if necessary, you could obtain photostat copies of any of them, on application to FOOD MANUFACTURE.

The subject is too large a one to be treated in this section, but recipes which have appeared in past issues of FOOD MANUFACTURE, as given above, should be of help.

The equipment comprises boiling pans, mincers, mixers, fillers, retorts, etc.

Sausages and Cooked Meats

7,304. *We are manufacturers of all kinds of Continental Sausage and Cooked Meats, and as I am at present managing the factory I have a good ground knowledge of the trade, but I should like to go further into it. For example, is there any research work that I could take up, or anything appertaining to our branch of the trade? I should be obliged if you could recommend me to anything that would help.* (Manchester.)

It is a little difficult to gather exactly what you require; perhaps the first thing you ought to do is to get some standard books on the subject, among which may be recommended *Small Goods Production* by Frank Gerrard, published by Leonard Hill, Ltd. No doubt as a subscriber you receive *Food Industries Manual*, which you should find very useful for your purposes. For the purpose of study there is a good institute in London, Smithfield Meat Trades Institute, but, of course, this is not much good to you in Manchester. At the same time, if you were to write to the Director he might be able to tell you of a similar institute in Manchester.

Information Supplied

7,214. *One of our clients is requiring machinery for making small cubes similar to Oxo beef extract cubes, and it has occurred to us that you might be able to let us have the addresses of firms making this class of machinery.* (London.)

Names of firms were given.

7,217. *We are at the moment interested in the process of producing potato crisps, and wonder if you can help us in this respect. Actually we intend producing in fairly large quantities, and require the necessary machinery for doing so, and if you are able to do so we should be grateful if you could put us into touch with a firm manufacturing such machinery.* (London.)

This was done.

7,224. *We noticed in a recent issue the makers of "Sucromel"—a substitute for glycerine—were asked for. We should also be glad if you could forward us the name and address of same.* (London.)

This was done.

7,227. *As we are in urgent need of rubber composition rings as per enclosed sample, we shall be obliged if you will forward these to such manufacturers or exporters who are able to submit samples and cable lowest c.i.f. quotations.* (Malta.)

The necessary firms were advised of this enquiry.

7,228. *In a recent issue there was an article on mono- and di-glycerides as used in food manufacture. We are interested in the purchase of Glyceryl Monostearate and Glyceryl Monolaurate, and shall be very grateful if you can give us any information as to the best source of supply.* (Herts.)

The name of a supplier was given.

7,234. *We should be glad if you could furnish us with the names of firms or manufacturers who are in a position to supply edible casein.* (Croydon.)

The names of firms were given.

7,236. *We have been asked to supply, if possible, a price and value for marquisa juice, which, as far as we know, comes from the Dutch East Indies. Our friend requires the market value at the end of October, 1940, and we wonder whether you could supply this information.* (Middlesex.)

Names of firms with whom to get in touch were given.

7,239. *We shall be glad if you will kindly supply us with the names of firms who manufacture small labelling machines.* (London.)

This was done.

7,259. *We shall be glad to learn whether you can put us in touch with the makers of compounds suitable for making onion and celery salt.* (Cheshire.)

Sources of supply were given.

7,261. *We would be pleased to learn if you are in a position to let us know of anyone who specialises in the manufacture of meat extract suitable for use in the manufacture of sausages.* (Glasgow.)

This was done.

7,269. *Please be good enough to advise us of the English manufacturers of pea and bean filling machines.* (Berks.)

Names were given.

7,287. *We shall be pleased if you can put us in touch with a firm who manufacture machines for cleaning, slicing and dicing vegetables.* (London.)

Names of suppliers were given.

7,288. *Can you please supply us with the names of manufacturers of potato flour?* (Manchester.)

This was done.

RECENT PATENTS

These particulars of new patents of interest to readers have been selected from the "Official Journal of Patents", and are published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

Abstracts of Recent Specifications

Group Abridgments can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, either sheet by sheet as issued on payment of a subscription of 5s. per Group Volume, or in bound volumes price 2s. each.

Improvements in and Relating to the Production of Flour or Meal from Cereals

When flour or meal containing part or all of the germ and/or bran is stored, rancidity is found to occur. This rancidity can be attributed to enzyme reaction. Enzymes are to be found not only in the outer coats of cereal grains but also in the cellular structure of the endosperm and the germ, particularly the latter. The activity resulting in rancidity does not commence until the grain has been crushed or reduced to flour (meal).

According to the invention, the occurrence of rancidity is prevented by producing in the grinding chamber during the grinding operation a temperature lying between 70° C. and 125° C. whereby at the time of its production the flour or meal is subjected to the action of heat such that subsequent enzyme reaction is substantially inhibited. It is found that the duration of the heat treatment varies with the temperature employed. If the flour is maintained at 110° C. for 30 seconds complete protection against rancidity is obtained, while at 90° C. a duration of 10 minutes is needed for equivalent results. No appreciable retardation of rancidity is observed even after prolonged treatment below 70° C.

By applying the heat treatment at the moment of reduction of the grain to flour (meal), it is ensured that the entire product is uniformly treated and the potential enzyme reaction is inhibited from the time at which conditions are produced under which such reaction could otherwise occur.

The process can be put into practice with any suitable type of milling mechanism provided in known manner with means for heating the grinding rolls or plates.

The actual temperature varies of course with the design of the mill and the manner in which it is operated.

537,271. Magnus Pyke.

Latest Patent Applications

7778. Franklin, W.: Cleansing, etc., agents.
7797. Gadd, J. J.: Tin-openers.
7799. Steel and Co., Ltd., J. M. (I.G. Farbenindustrie Akt.-Ges.): Amide cattle feed.
7811. Warner, Harvey and Co., Ltd., and Siegel, W.: Production of fertilisers.
7817. British Boot, Shoe and Allied Trade Research Association: Treatment of protein, etc.
7866. Swinney, T. J.: Vapour condensers, etc.
7903. Lewin, M. M.: Poisons for vermin.
7976. Tyzack and Co., Ltd., S., and Bradley, W. H.: Silos.
7986. Sigma Instrument Co., Ltd., Loxham, J., and Boosey, F. R.: Methods and means for controlling the volume, etc., of fluids.
8007. Stevenson, M.: Heating device for flowers, vegetables, etc.
8046. Barker, J., Allen, R. J. L., and Mapson, L. W.: Production of vegetable products.
8050. Hercules Powder Co.: Manufacture of confectionery.
8114. Harber, L. S., and Baker Perkins, Ltd.: Moulding of dough.
8177. Janser, A., and Townsend, C. S.: Manufacture of vegetable products.
8330. Lyons and Co., Ltd., and Bushill, J. H.: Process for treating edible animal flesh.
8373. 8374. Frosted Foods, Ltd. (General Foods Corporation): Refrigerating apparatus.
8409. Macfarlane, R. F., and Dumbleton, C.: Means for transporting biscuits.
8514. Fairclough, D.: Preparation of dough.
8787. Du Pont de Nemours and Co., E. I., and Woodhouse, J. C.: Baking-powders.
9055. Metafiltration Co., Ltd., Pickard, J. A., and Mitchell, W.: Purification of fats, etc.
9095. Enock, A. G.: Bottle pasteurisation of milk.
9141. Hillson, A. K.: Preparation of foodstuffs.
9192. Du Pont de Nemours and Co., E. I.: Granulation of fertilisers.
9345. Holly Sugar Corporation: Processes of treating sugar-beet juices.
9849. National Biscuit Co.: Production of cereal foods.

Specifications Published

Printed copies of the full Published Specifications may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, at the uniform price of 1s. each.

537,171. Tanikawa, R.: Methods of keeping cold or refrigerating foodstuffs for preservation purposes.
537,211. Lundsgaard, H. C.: Emulsifiers.
537,236. Robinson and Son, Ltd., T., and Smith, L.: Conditioning and drying of cereal grain. (Cognate Application, 16498/40.)
535,321. Krim-Ko Co.: Chocolate or cocoa drinks.
535,322. Jonsson, P. W.: Cabinet for storing goods under humidity-controlled conditions.
537,423. Weizmann, C.: Alimentary preparations.
537,535. American Can Co.: Method of stabilising the colour of vegetables during canning and storage.
537,669. Jones, C. R., and Greer, E. N.: Reduction of potatoes and other starch-containing vegetables to dry powder.
537,741. Gamper, R.: Obtaining of fruit-juice products.
537,746. Farrer, J. O. (Continental Can Co., Inc.): Preparation of can-body blanks.
537,758. Hobson, A. J.: Apparatus for cutting vegetables.
537,763. United Fruit Co.: Method of and apparatus for separating the stalks of abaca and other plants into individual leaf sheaths.
537,867. Oxley, W. G.: Method of preparing meat for transport.
537,972. Rafuse, B. L.: Processes for canning vegetables containing naturally occurring polysaccharides.
537,982. Shearsby, L. W. H.: Latex compound to be used in connection with the preservation of certain foods, and method of making and applying the same.
538,084. American Maize-Products Co.: Bakery products.

TRADE MARKS

The list of trade marks of interest to readers has been selected from the "Official Trade Marks Journal" and is published by permission of the Controller of H.M. Stationery Office. The journal can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C. 2, price 1s. weekly (annual subscription £2 10s.).

CAUSERIE.—611,432. Coffee, tea, cocoa, sugar, rice, tapioca, sago, coffee substitutes; flour and preparations made from cereals; bread, biscuits (other than biscuits for animals), cakes, pastry, confectionery, chocolate, sweetmeats, ices, honey, treacle, yeast, baking powder, salt, mustard, pepper, vinegar, sauces, spices and ice. **New Claridge's Hotel, Ltd.,** Brook Street, London, W. 1. (Associated.)

CAUSERIE.—611,433. Fresh fruits and vegetables; flowers, live plants and foodstuffs for animals. **New Claridge's Hotel, Ltd.,** Brook Street, London, W. 1; Hotel Proprietors. (Associated.)

SONA.—612,631. Canned fruits, canned vegetables and cooked meats and vegetables canned together. **Stratford-on-Avon Produce Canners, Ltd.,** Birmingham Road, Stratford-on-Avon; Canners.

MACOVA.—613,144. Egg substitute. **McDowall, Morrison and Co., Ltd.,** 5, Nursery Street, Glasgow, S. 1; Manufacturers and Merchants.

SEMOFOOD.—613,879. Food preparations made from cereals. **Semolina Food Products, Ltd.,** 3, Empire Way, Wembley Park, Middlesex; Manufacturers of Food Products.

CHIEFTAIN.—614,013. A preparation made wholly or mainly of yeast for spreading on bread. **British Fermentation Products, Ltd.,** Chieftain Works, Putney Bridge Road, London, S.W. 15; Merchants. (Associated.)

KIPAGRAS.—614,392. Kipper pastes. **Nancy Howlie Chettle Tennent,** Kincardine Castle, Auchterarder, Perthshire; Manufacturer of Fish Paste.

NEW COMPANIES

Epoch Products, Limited. (365240.) 1-3, Vivian Mansion, Hendon Central, N.W. 4. To take over the bus. of mnfrs. and producers of food products and beverages cd. on at 5, Dollis Mews, Dollis Park, N. 3, as the "Epoch Products Co." Nom. cap.: £1,000 in £1 shares. Dirs.: Not named. Subs.: D. C. Allen, 1-3, Vivian Mansions, N.W. 4 (acct.); L. Thomas, 1-3, Vivian Mansions, N.W. 4 (acct.).

Frank's Special Mints, Limited. (365402.) 10, Russell Street, Cardiff. To carry on the bus. of confectionery mnfrs., etc. Nom. cap.: £500 in £1 shares. Dirs.: V. C. Hunt, 146, Llandaff Road, Cardiff; Faith B. Thomas, 127, City Road, Cardiff.

Arthur Powell, Limited. (365434.) 18, Custom House Street, Cardiff. To carry on bus. of butchers' outfitters, packers, provn. mchts., etc. Now cap.: £4,000 in £1 shares. Dirs.: A. Powell, Mrs. G. Powell and Beryl Powell, all of 18, Duffryn Road, Cardiff; A. D. Powell, Normanton, Lon-y-rhyd, Rhiwbina, Cardiff.

Premier Sausage Company (Allens), Limited. (365879). 11, St. James' Street, Brighton. Nom. cap.: £1,500 in 5,000 shares of 1s. and 1,250 shares of £1. Dirs.: To be appointed by the subs. Subs.: S. W. Parsley, 1, D'Aubigny Road, Brighton; Miss D. R. Allen, "Woodlands," Graham Avenue, Withdean, Brighton.

C. K. Seez and Sons, Limited. (365643.) 161, Blackstock Road, N. 4. To take over the bus. of butchers, importers of continental delicacies, etc., formerly cd. on as "C. K. Seez and Sons." Nom. cap.: £2,000 in £1 shares. Dirs.: C. K. Seez, 94, Finsbury Park Road, N. 4 (permt. gov. dir.); C. C. G. Seez, 1, Morton Way, Southgate, N. 14; F. J. Seez, 94, Finsbury Park Road, N. 4.